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# The Province of Alberta

*Natural Gas Utilities Board*

## IN THE MATTER OF "THE NATURAL GAS UTILITIES ACT"

—and—

IN THE MATTER OF an Enquiry into  
Scheme to be adopted for Gathering,  
Processing and Transmission of  
Natural Gas in Turner Valley

G. M. BLACKSTOCK, Esq., K.C., *Chairman*

Dr. E. H. BOOMER, F.C.I.C., *Commissioner*

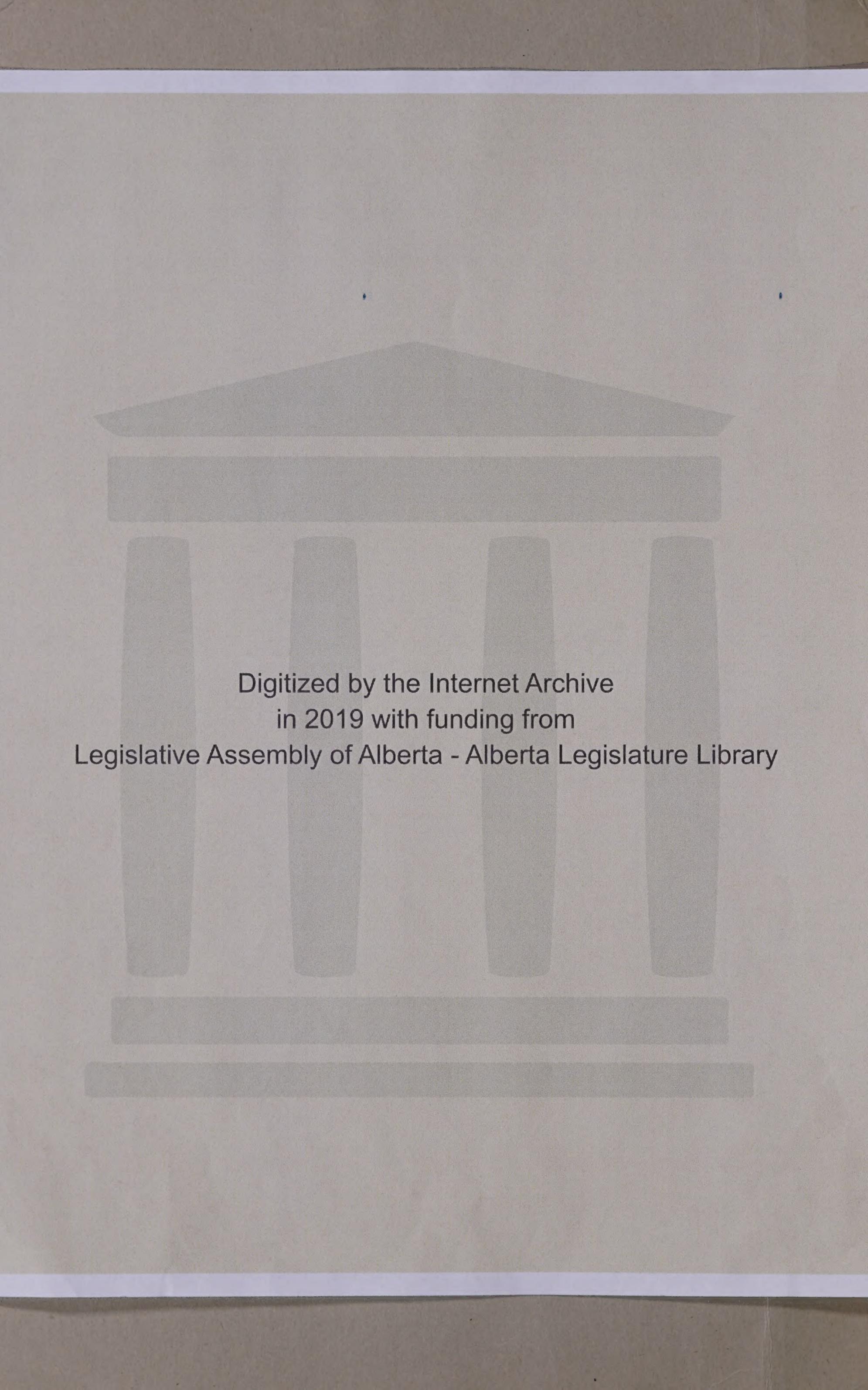
*Session:*

CALGARY, Alberta March 24th, 1947.

**VOLUME** 1

DECISION



A faint, large watermark of the Alberta Legislature building is visible in the background. The building is a classical structure with a prominent portico of Corinthian columns supporting a triangular pediment. The columns are fluted, and the building is light-colored.

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IN THE MATTER OF "The Natural  
Gas Utilities Act":

AND IN THE MATTER OF an Inquiry  
into the Turner Valley Natural  
Gas Field for the purpose of  
fixing prices and other relative  
matters.



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GOVERNMENT OF THE PROVINCE OF ALBERTA

THE NATURAL GAS UTILITIES BOARD

ORDER NO. 34

IN THE MATTER OF "The Natural Gas Utilities Act":

AND IN THE MATTER OF an inquiry into the Turner Valley Natural Gas Field for the purpose of fixing prices and other relative matters:

This is an investigation initiated by The Natural Gas Utilities Board pursuant to its powers under The Natural Gas Utilities Act, being Chapter 4 of the Statutes of Alberta, 1944. The reason for the investigation may briefly be stated.

Turner Valley Oil and Gas Field is situate approximately thirty miles south-west from the City of Calgary. Drilling for oil began in this field in the year 1914 but it was not until 1924 that Royalite Oil Company Limited brought in a well on Legal Subdivision Twelve (12) of Section Seven (7), in Township Twenty (20), Range Two (2), West of the Fifth Meridian, known as Royalite No. 4, which had an initial gas flow of approximately 22,000,000 cubic feet per day. The gas produced was saturated with naphtha and as a result development followed rapidly and many wells were drilled, to secure the naphtha production. In the meantime, The Canadian Western Natural Gas, Light, Heat and Power Company Limited, which furnished natural gas to consumers through a distribution system which extended from Calgary to Lethbridge and thence to communities on the Crows Nest Line of the Canadian Pacific Railway Company, required additional supplies for its market and negotiated an agreement with Royalite, whereby the latter secured the exclusive right to supply natural gas from Turner Valley to Canadian Western for the needs of its customers.

1. *Pyrolytic* *degradation* *of* *polymers* *in* *the* *presence* *of* *water* *vapour* *and* *oxygen* *at* *various* *temperatures*

In course of time, crude oil was discovered in the westerly part of the field and again intensive development took place, until a time came when the limits of the field became reasonably well defined. The known productive area of Turner Valley is about twenty miles long and varies in width from one to two miles. It is divided longitudinally into two areas known respectively as "the gas cap" on the east flank and "the crude oil zone" on the west flank, the former of which produces natural gas containing natural gasoline and naphtha, while the latter zone produces crude oil under the lifting power of connate natural gas, which also contains natural gasoline. The northern area of the gas cap formerly was largely and now is controlled by Royalite which, in course of time, constructed two absorption plants for the recovery of natural gasoline. The natural gas in both areas of the field contains sulphuretted hydrogen in noxious quantities and a scrubbing plant was built for the removal of this dangerous substance. In the central portion of the field, Gas and Oil Products Limited established an absorption plant for the recovery of natural gasoline.

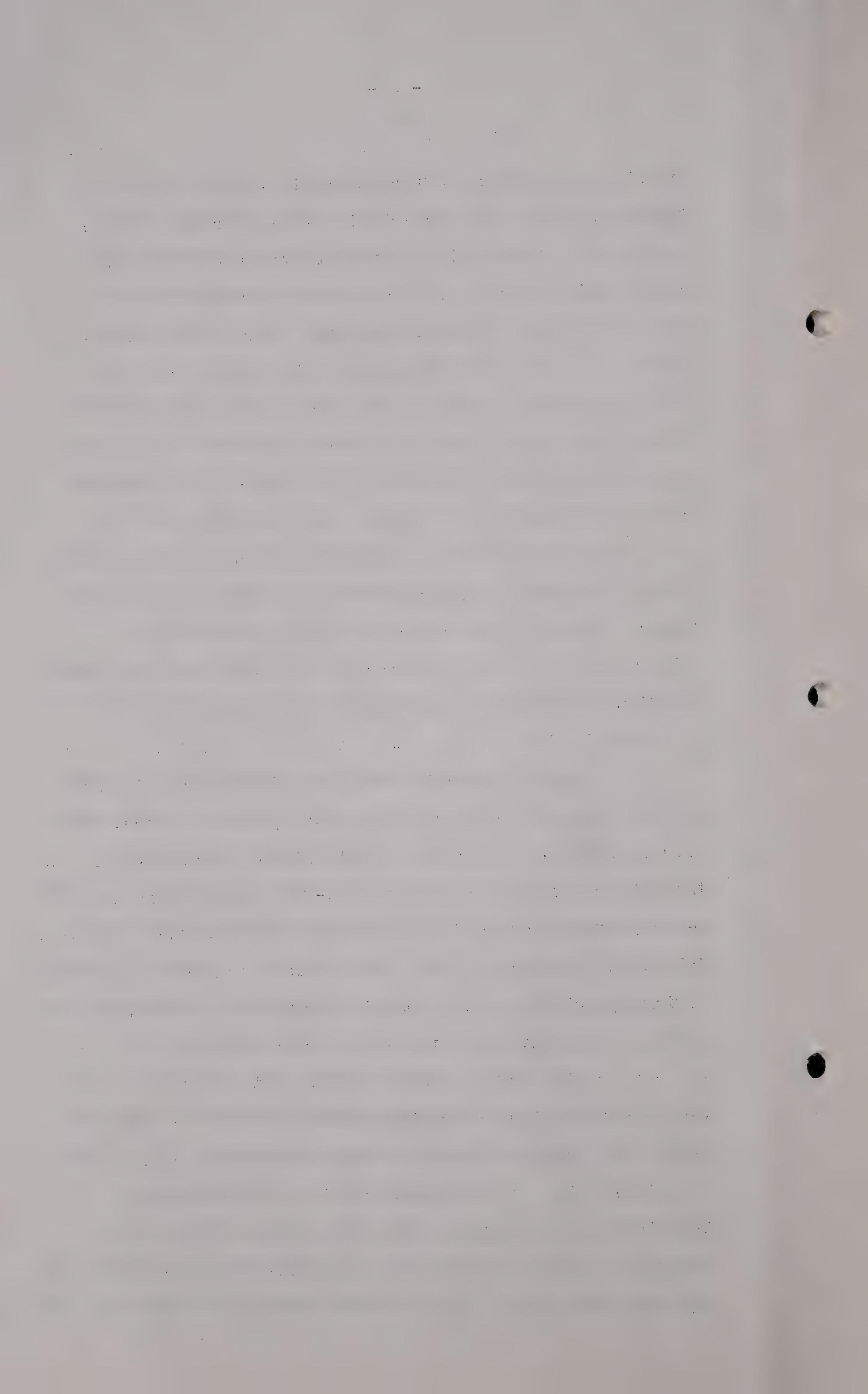
British American Oil Company Limited established an absorption plant in the southern portion of the field for the recovery of natural gasoline. The result was that natural gas was being produced from the gas cap in tremendous quantities, primarily for the recovery of its naphtha and natural gasoline content, while natural gas - the lifting power - was produced in the crude oil zone. In the case of Gas and Oil Products Limited and the British American Oil Company Limited, gas from which natural gasoline had been recovered was used in relatively small quantities



for field purposes and the balance was burned in flares. Royalite used its gas after absorption, to some extent, for use in the field for drilling fuel, for plant fuel, and for sale to Canadian Western to the extent of the latter's demand, and some was stored in the Bow Island field. Up until 1938 the balance was flared. In 1940, Royalite secured an additional small market through the sale of gas to the Valley Gas Company Limited, which sold retail for domestic purposes to consumers in the hamlets scattered throughout the field. In the crude oil zone, gas produced from wells not connected to absorption plants and not required for field purposes or drilling fuel was wasted. Between the year 1924 and the present time literally billions of cubic feet of natural gas were wasted either by being burned in flares or by being dissipated in the air.

Various measures were instituted by the Government to regulate production from the oil zone and in 1940, what is known as "the Brown Plan" was put into force. Briefly stated, the Brown plan, in its application, forbids the withdrawal of more than twenty-five barrels per acre per day of reservoir fluid from any well. Under this plan, "allowables" are assigned to all wells which determine the maximum possible daily production from each of them.

The advent of the last war was responsible for the construction of an ammonia plant south of Calgary and that plant required approximately nine million cubic feet of gas per day for the manufacture of its products. Royalite, which supplied this requirement through the Canadian Western system, found it necessary to produce from the gas cap natural gas in volumes greatly in excess of the

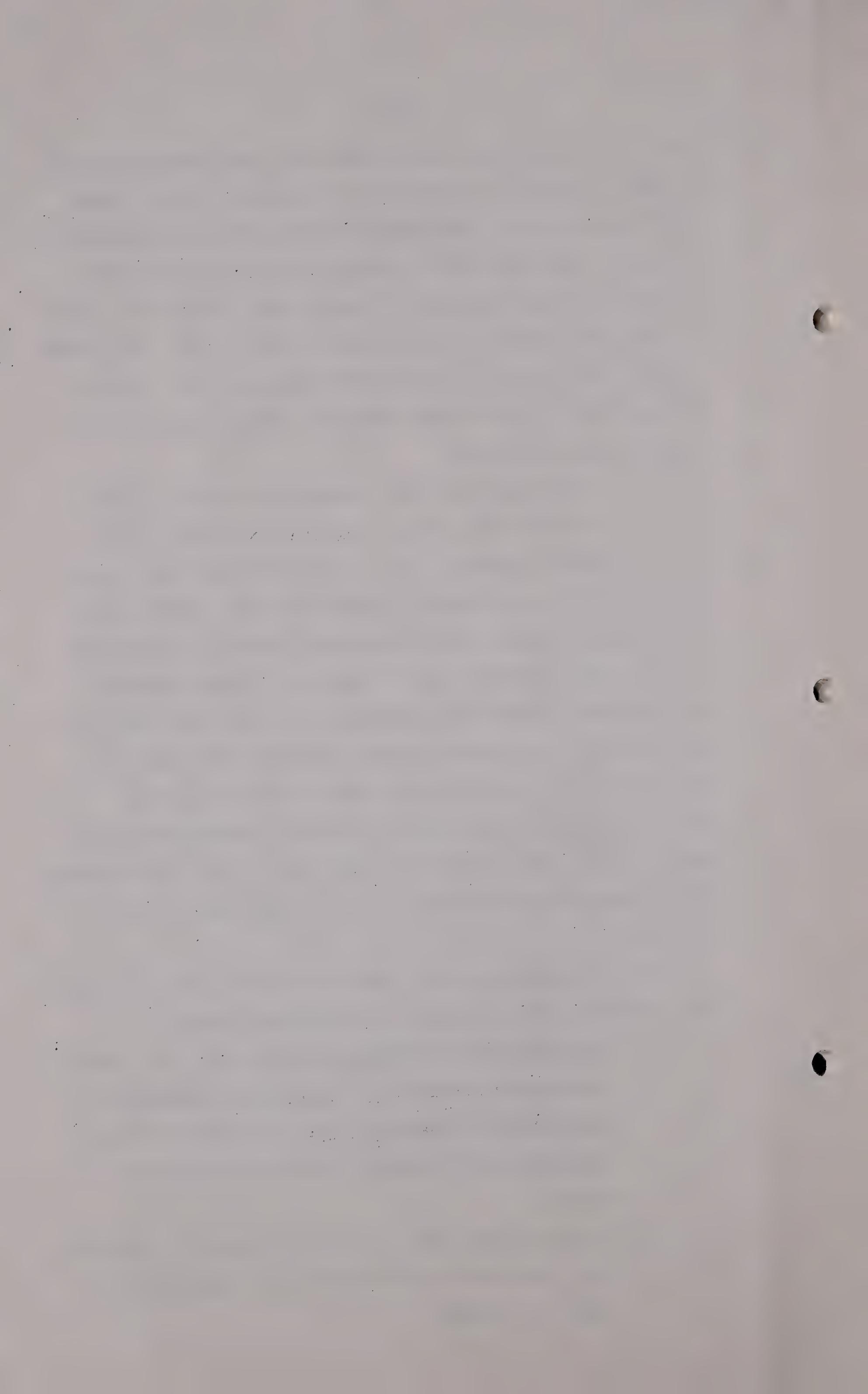


Brown allowables in order to meet the combined peak demand of the distribution system and the ammonia plant. There then was a position where one company, having an exclusive contract, produced gas in excess of its allowables while, at the same time, millions of cubic feet of gas were being produced and wasted in other parts of the field. An effort was made to secure a co-operative measure of gas conservation between the various companies interested but that effort proved abortive.

This Board was then constituted under and its powers defined by The Natural Gas Utilities Act. Pipe lines, scrubbing plants, wells, systems, plant and equipment, for the production of natural gas were declared to be public utilities. Any exclusive feature in a contract such as that contained in the agreement between Royalite and Canadian Western was declared to be null and void and the Board was given wide powers respecting the sale of natural gas, the prices to be paid to producers, the production from wells, the return to the underground formation of gas not required for the market, and the retention of natural gas in the ground by the restriction of production.

In particular, the Board was given power to order the proprietor of pipe lines or scrubbing plants:-

- (a) to construct or re-arrange pipe lines, to install compressor stations and equipment necessary for conserving and handling gas for delivery to any absorption or scrubbing plant or compressor station;
- (b) to gather and transport to any point all natural gas which can be effectively and economically used or stored;



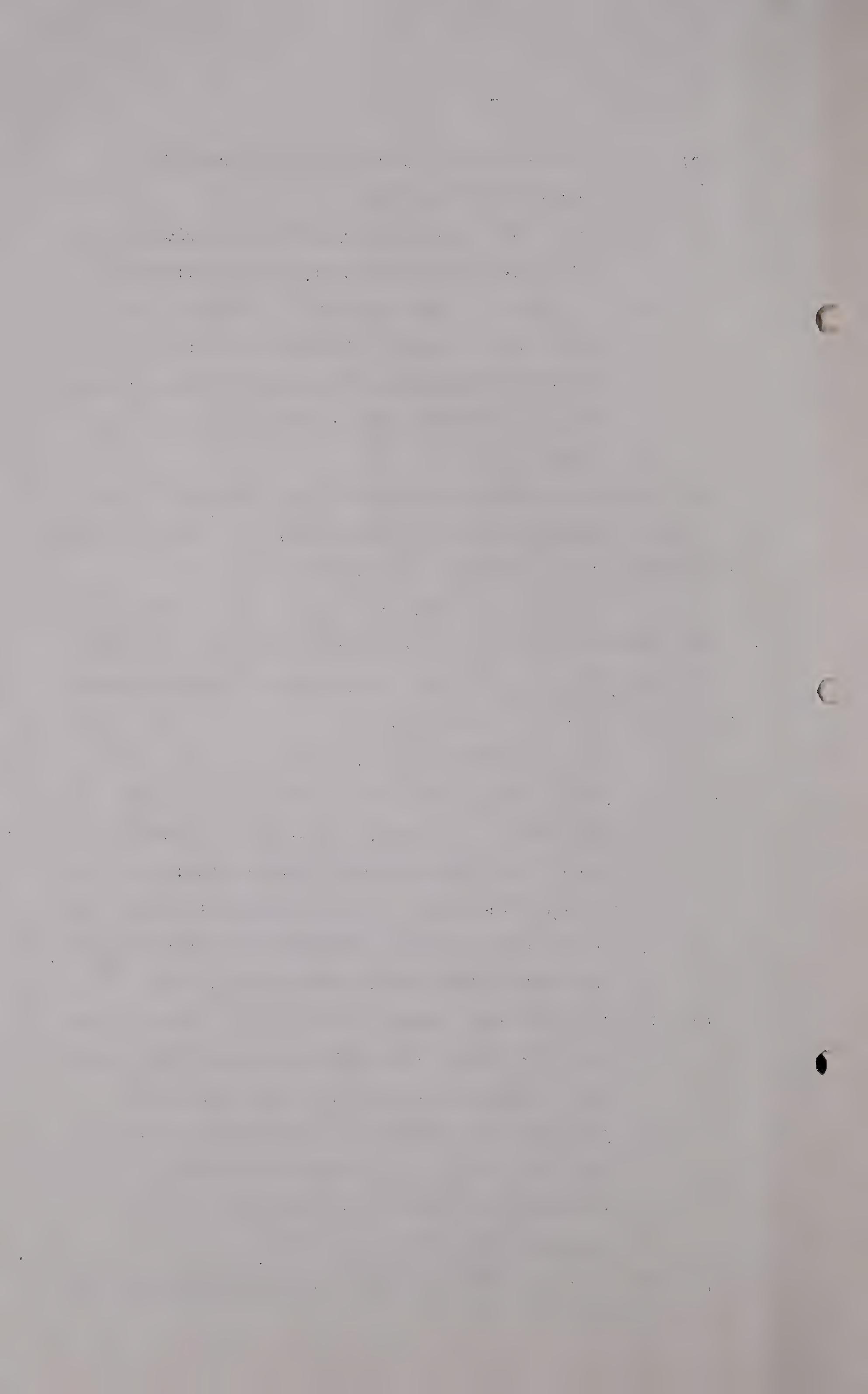
- (c) to purify market gas by removal therefrom of sulphuretted hydrogen;
- (d) to purchase and take delivery of gas at prices and in the quantities ordered by the Board;
- (e) to return to the underground formation gas produced in excess of market requirements;
- (f) to sell natural gas to wholesalers and retailers in the quantities and at prices fixed by the Board.

The Board has power to order owners or operators of gas wells to produce gas in required quantities, failing which, further production can be prohibited.

Owners or operators of gas wells may be ordered to restrict or discontinue production or permit any well to be used as an input well - all subject to such compensation as the Board may prescribe.

The Board has power to fix:-

- (a) the just and reasonable price to be paid to producers for natural gas, either at the well-head or at the gas exit from the separator; and to fix the price of gas at any point on the pipeline connecting the well-head or separator and any absorption plant or scrubbing plant;
- (b) the just and reasonable price for gas which has been delivered to an absorption plant and after the absorption product has been extracted;
- (c) the just and reasonable price for gas after it has been purified, including the price to be paid by any purchaser thereof for resale to the ultimate consumer;
- (d) the just and reasonable price to be paid for gas



which is returned to the underground formation;

- (e) a price to be paid for gas retained in the underground formation;
- (f) the proportions in which the proceeds from the sale of absorption plant products shall be divided between producers and the owners of absorption plants.

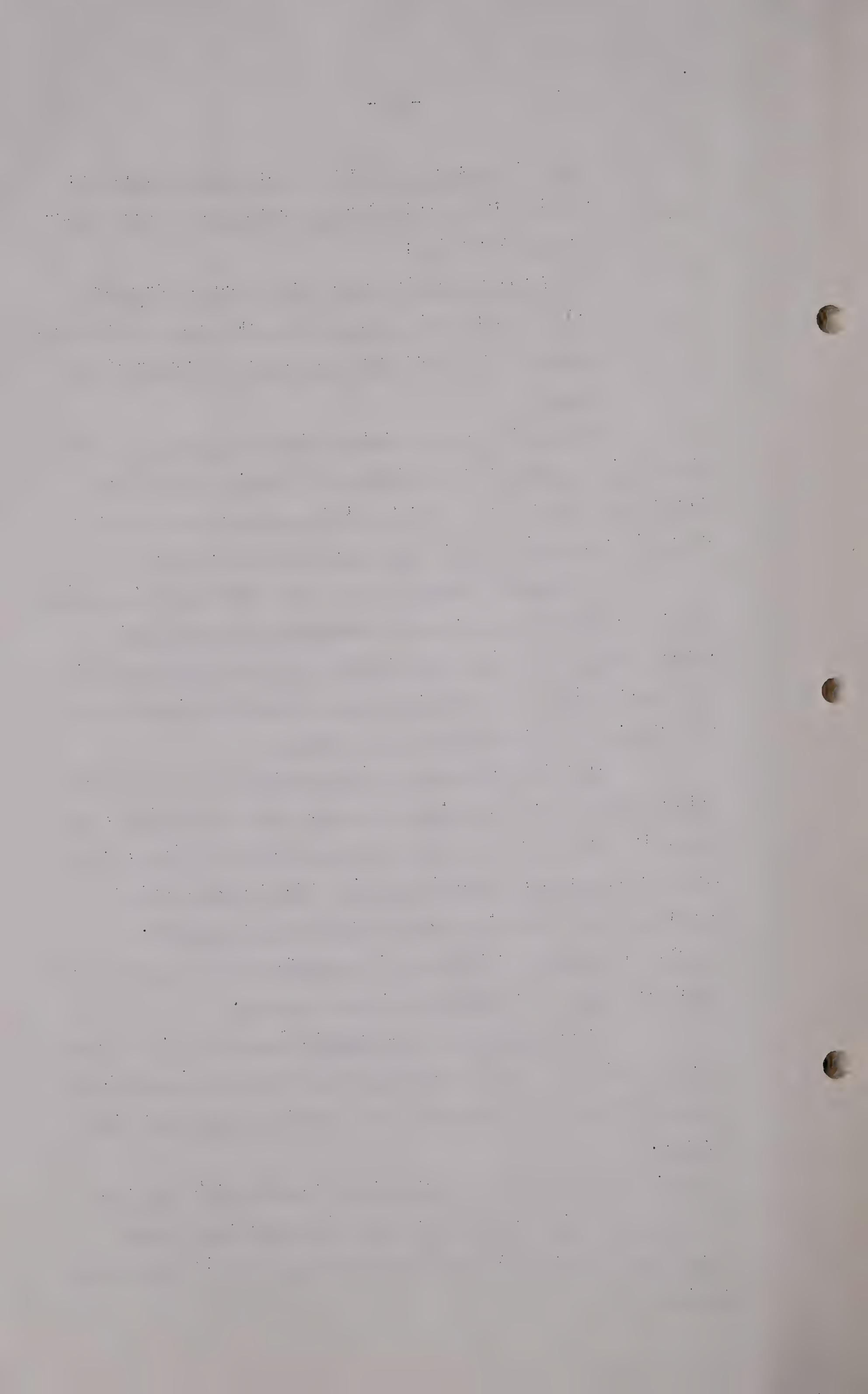
It may be stated broadly that the purpose of the Statute is to effect conservation of natural gas and to secure to producers, as far as it is possible to do so, a share in any market which can utilize natural gas.

Pursuant to these powers, the Board held a hearing in May 1944 for the purpose of determining what orders should be made for the construction of pipe lines and for the installation of such machinery as might be required to effectuate the provisions of the Statute.

Royalite secured the incorporation of The Madison Natural Gas Company Limited, a wholly owned subsidiary, to which it transferred all its wet gas gathering lines, compressor equipment, scrubbing plant, power plant, water plant and other assets used in connection therewith. Royalite, however, retained the ownership of the gas wells which it owned or controlled in the gas cap.

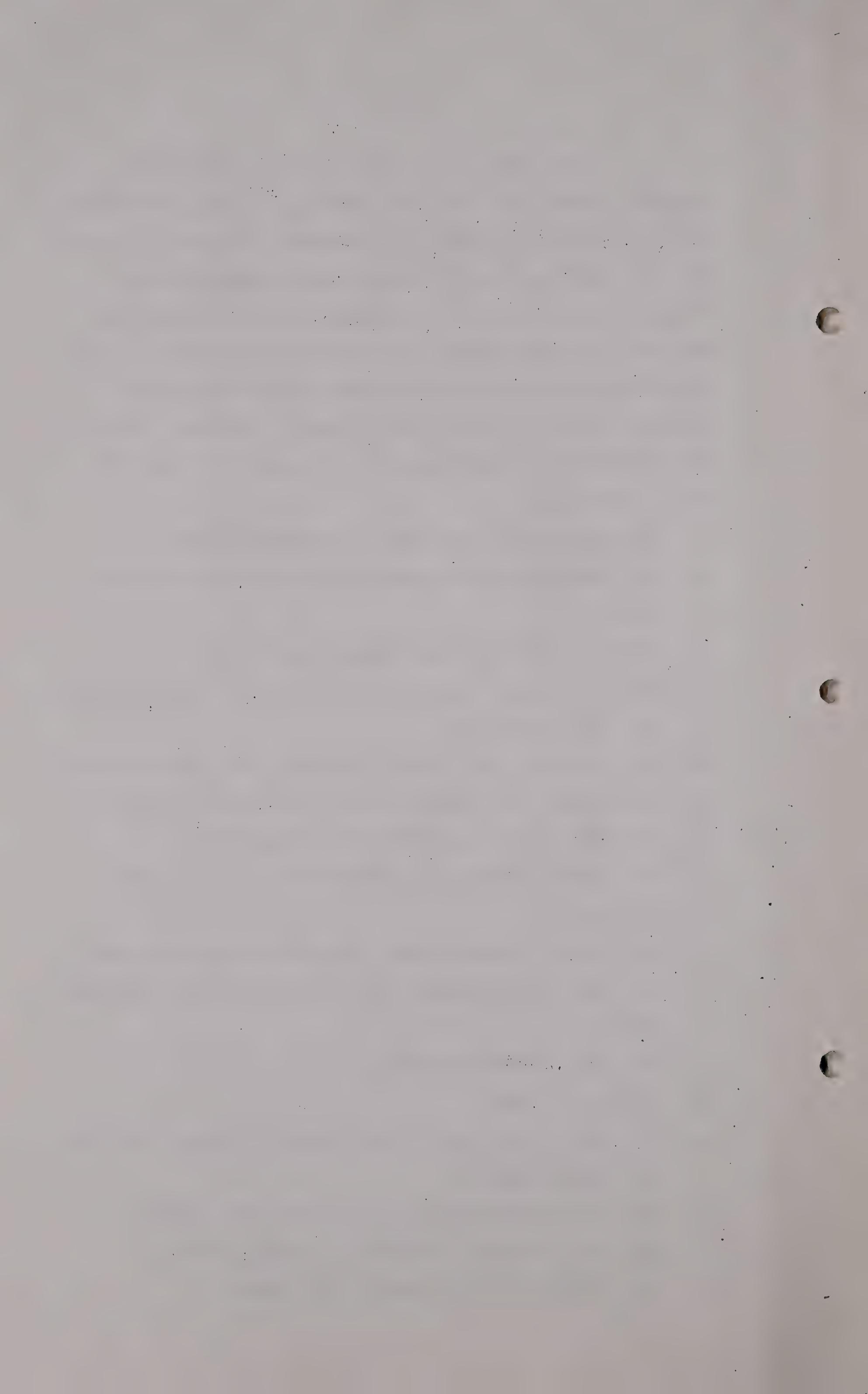
British American Oil Company Limited secured the incorporation of British American Gas Utilities Limited, to which it transferred its wet gas gathering lines and water system.

Prior to the enactment of the Statute, Gas and Oil Products Limited had sold its refinery, absorption plant and wet gas gathering lines to Gas and Oil Refineries Limited.



Orders were made following the preliminary hearing in May 1944, directing Madison Natural Gas Company Limited and British American Oil Company Limited to proceed with the construction of specific gas gathering lines, residue gas lines and the installation of the machinery required for the operation of the various systems. These installations were practically completed by the end of 1944 and the Board fixed the 15th day of January, 1945, as the date for the commencement of the hearing to try the following issues:

1. The gas reserves in the Turner Valley Field.
2. Gas resources of the Province other than in Turner Valley.
3. Present and estimated future market demand.
4. Market sharing and pooling arrangements as to conserved and repressured gas.
5. Rate base for the British American Oil Company Limited.
6. A rate base for Madison Natural Gas Company Limited.
7. The rate of return on the rate bases fixed.
8. The method of computing depreciation and the rate thereof.
9. The cost of gathering and transmitting residue gas.
10. The cost of delivering wet gas to the natural gasoline plants.
11. The cost of scrubbing gas.
12. Competing fuels.
13. The price to be paid for gas going to market after it has been scrubbed.
14. The price to be paid for gas at the well-head;
  - (a) when such gas requires to be compressed;
  - (b) in case the gas goes to the market;



- (c) in case the gas is used for repressuring;
- (d) the price to be paid for gas left in the formation notwithstanding the allowable fixed by the Conservation Board.

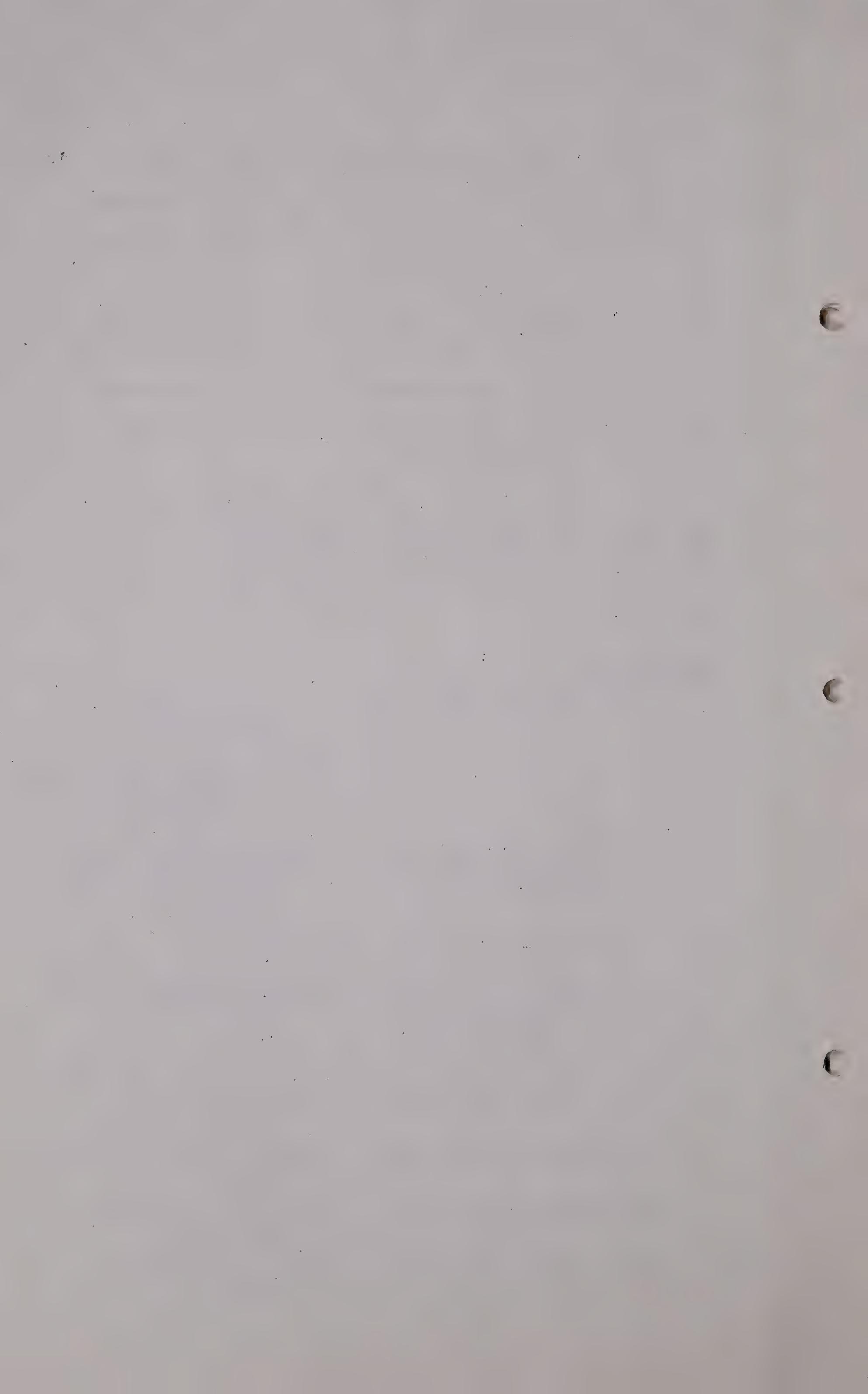
15. The revision of contracts which are subject to the Board's jurisdiction in case any person desired such a revision (excepting Absorption plant agreement).

16. The settlement of the terms of all new contracts which will be required.

At the request of Counsel, the commencement of the hearing was adjourned until 12th March, 1945. It began on that date and continued intermittently until 21st June, 1946.

APPEARANCES:

C. S. Blanchard, Esq., K.C.	for the Attorney General of Alberta.
Geo. H. Steer, Esq., K. C.	for The Canadian Western Natural Gas, Light, Heat and Power Company Limited.
E. J. Chambers, Esq., K. C. with him	for Royalite Oil Company Limited and Madison Natural Gas Company Limited.
J. Ragnar Johnson, Esq.,	
A. H. Hannah, Esq., K.C.	for Imperial Oil Limited.
E. L. Harvie, Esq., K.C. with him	for British American Oil Company Limited.
R. H. C. Harrison, Esq.,	
L. H. Fenerty, Esq., K.C.	for the City of Calgary.
W. H. McLaws, Esq., K.C.	for The California Standard Company.
J. C. Mahaffy, Esq., K.C.	for Gas and Oil Refineries Limited.
D.P. McDonald, Esq.,	for Alberta Petroleum Association.
M. M. Porter, Esq., K.C.	for Home Oil Company Limited.

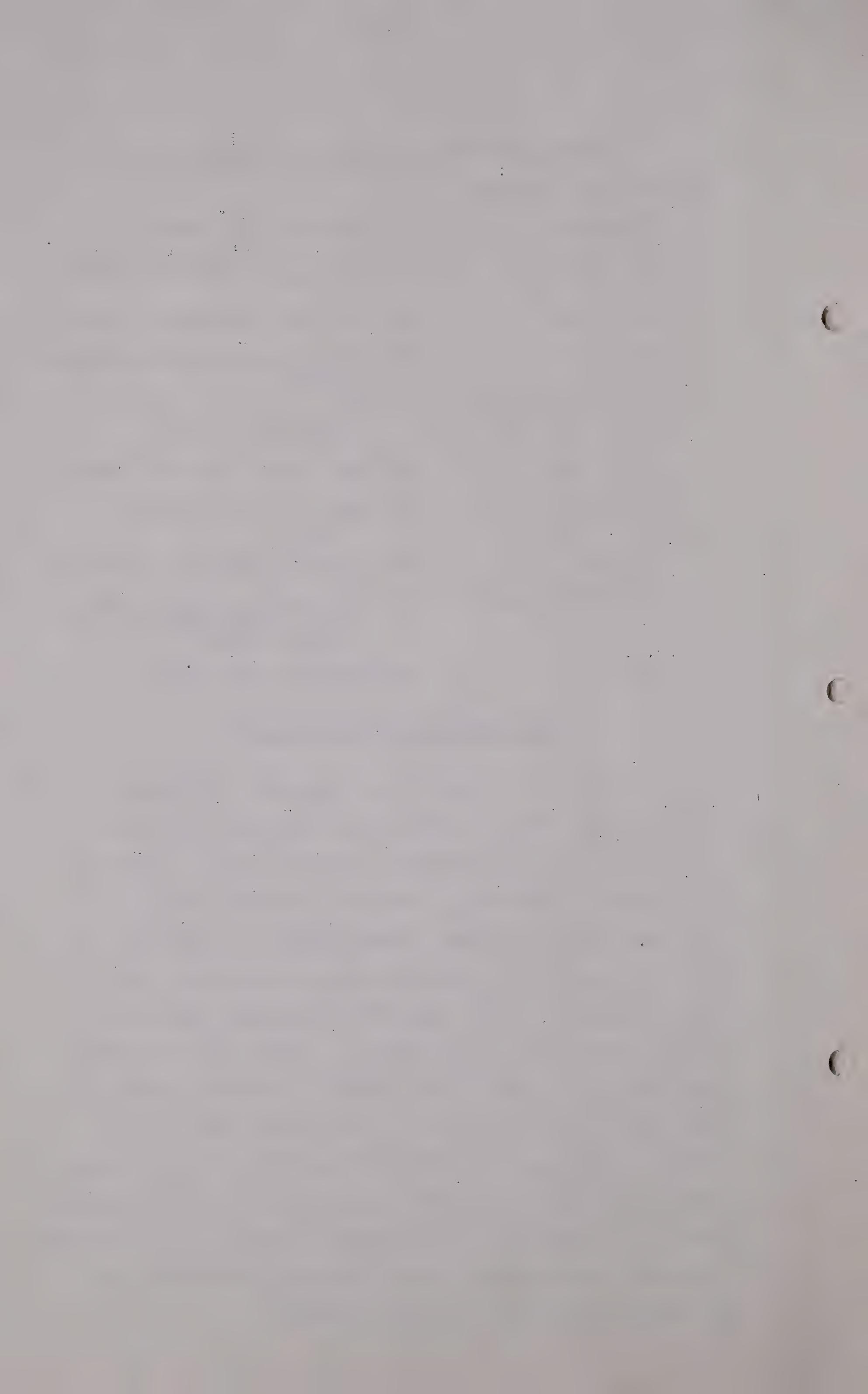


Throughout this decision the following abbreviations will be used:

"Imperial"	for Imperial Oil Limited
"Madison"	for Madison Natural Gas Company Limited
"Royalite"	for Royalite Oil Company Limited
"B. A."	for British American Oil Company Limited
"B. A. Utilities"	for British American Gas Utilities Limited
"G. O. P."	for Gas and Oil Products Limited
"G. O. R."	for Gas and Oil Refineries Limited
"A.P.A."	for Alberta Petroleum Association
"Canadian Western"	for The Canadian Western Natural Gas, Light, Heat and Power Company Limited
"M.c.f."	for Thousand cubic feet.

#### GAS RESERVES IN TURNER VALLEY

Evidence respecting gas reserves was given by Donald L. Katz, Ph.D., Professor of Chemical Engineering in the University of Michigan; Ralph E. Davis, a graduate of Wisconsin University; Stanley J. Davies, Associate of the Royal School of Mines, London, England; Gordon A. Connell, a graduate in Chemical Engineering of the University of Alberta, and H. L. Stevens-Guille, a graduate of Birmingham University, England. All of these witnesses were eminently qualified to discuss the subject, although they used different methods in arriving at their final figures. The degree of unanimity between them in the final results arrived at, considering the magnitude of the figures, makes it unnecessary for the Board to enter into any detailed discussion or analysis of their evidence, which was given by each of them with a wealth of detail.

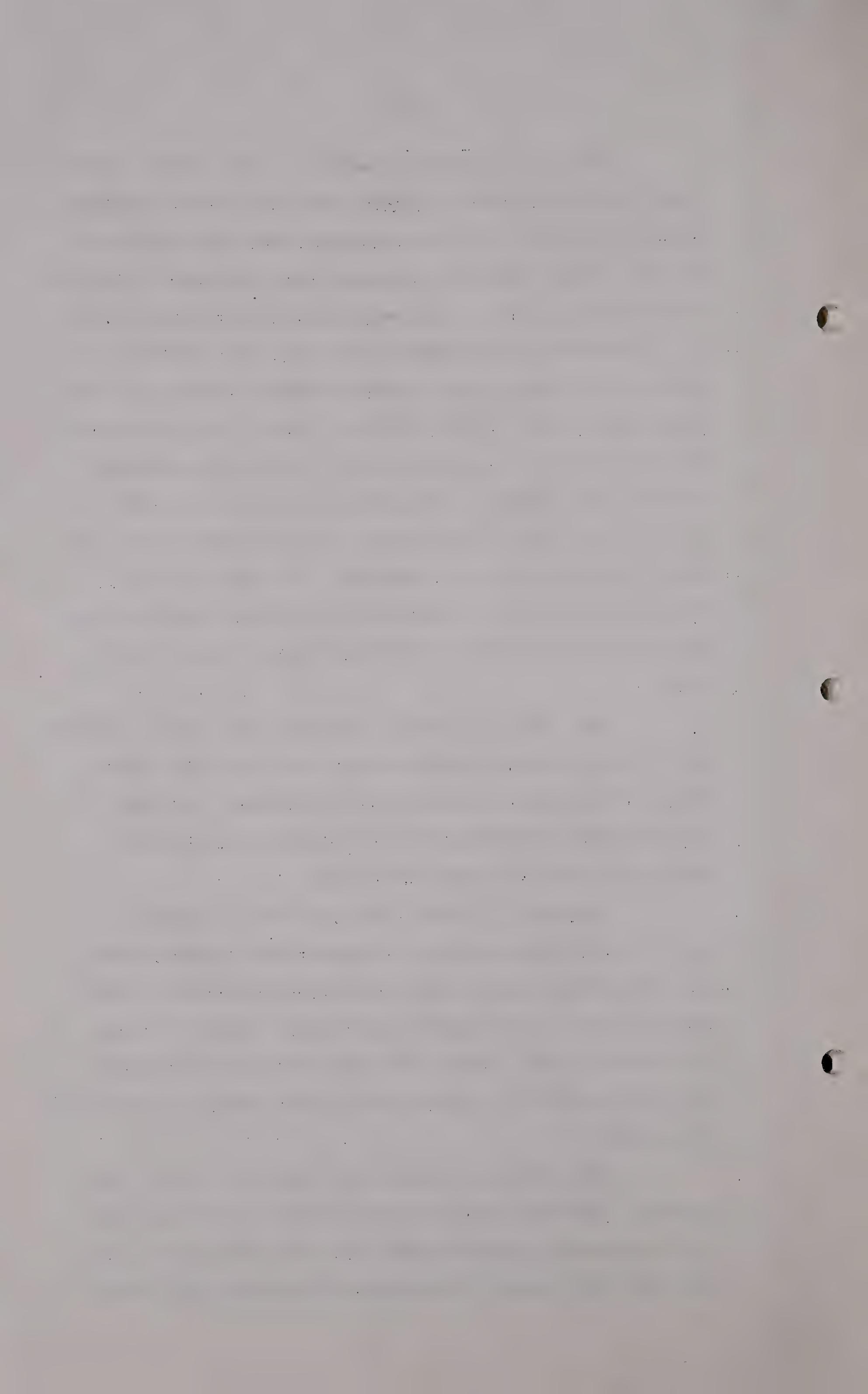


Dr. Katz, Technical Adviser to the Board, in his first calculation made in 1944, used the material balance method and arrived at the conclusion that the reserves in the whole field as at 1st January, 1944, amounted to 400.5 billion cubic feet. After making allowance for shrinkage due to recovery of absorption gasoline, the extraction of sulphuretted hydrogen and carbon dioxide, for gas used for field purposes and in the various plants, for gas produced at pressures too low to permit of its being economically gathered, his estimate of marketable reserves was 282 billion cubic feet. His revised figure as at 1st January, 1945, based upon data not available in 1944, was 317 billion cubic feet. He considered that this estimate was conservative and might be low by as much as twenty per cent.

Mr. Ralph E. Davis, a witness for Canadian Western, estimated the total reserves at 446 billion cubic feet, which, after making provision for shrinkage, plant and field use and low pressure gas, resulted in marketable reserves of 354.8 billion cubic feet.

Stanley J. Davies, for the City of Calgary, arrived at his conclusions by mathematical process based upon the average annual decline in the production of the various wells. After making allowances similar to those made by the other witnesses he estimated that marketable reserves amounted from 309 billion cubic feet to 315 billion cubic feet.

Mr. Gordon A. Connell for Royalite, in his computation, used the decline curve method for gas-cap wells and the material balance method for oil zone wells. His total wet gas reserve figure was 591 billion cubic feet,



predicated upon the abandonment of crude wells at 75 pounds pressure, and the abandonment of gas cap wells at a pressure of 100 pounds. His reserves estimate was 488 billion cubic feet if abandonment took place at ten barrels of crude oil per day, without reference to pressure.

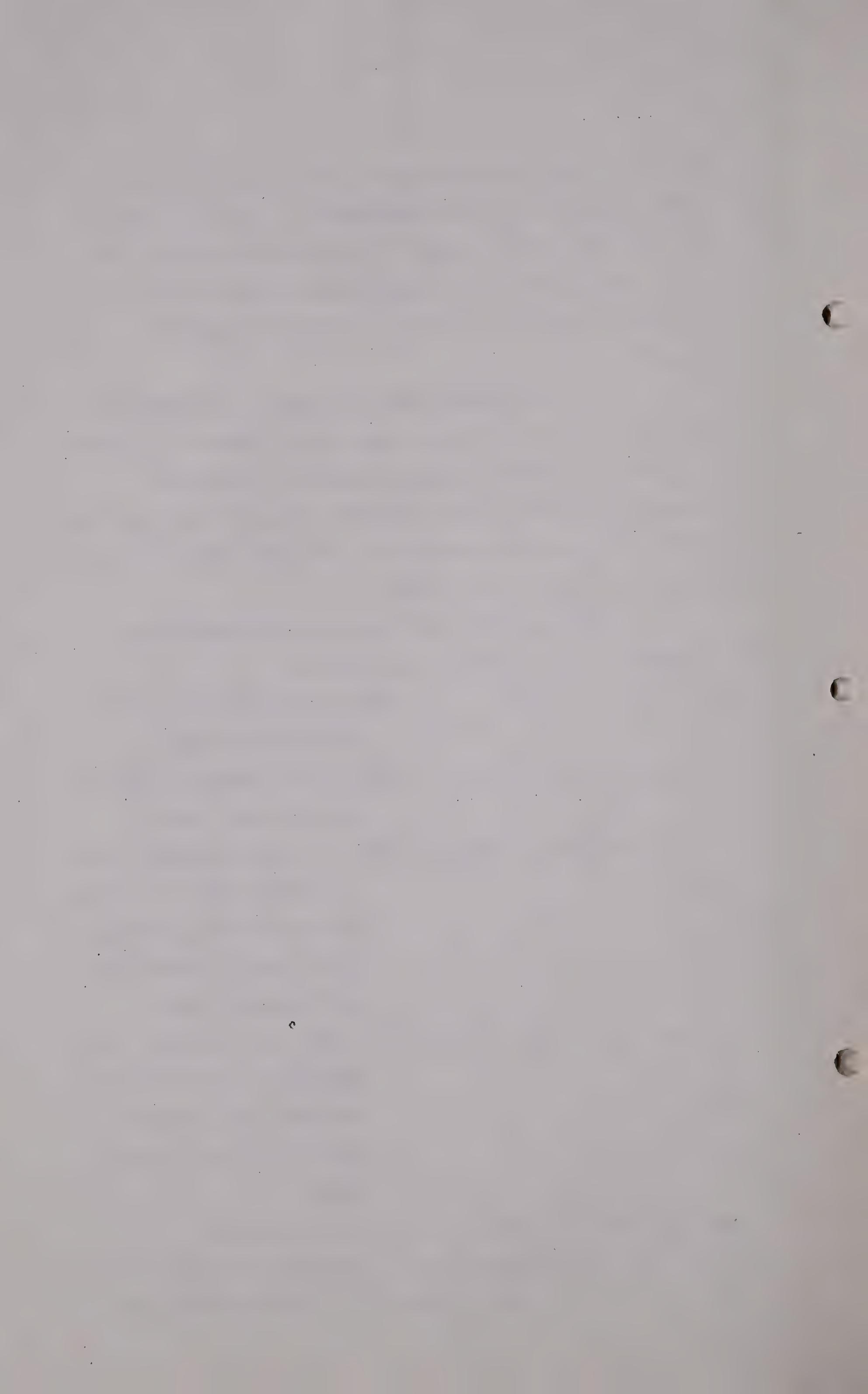
Mr. Stevens-Guille's conclusion, for Madison, was based upon the estimates made by Mr. Connell, to which he applied the various factors which he considered necessary to arrive at the economic result. His conclusion was that 361 billion cubic feet of dry gas could be economically delivered to the market.

The Board then had on first presentation the evidence of four witnesses, as follows:

Dr. D. L. Katz	317 billion cubic feet as at 1st January, 1945.
Mr. Ralph E. Davis	355 billion cubic feet as at 1st January, 1945.
Mr. Stanley J. Davies	309 - 315 billion cubic feet, depending upon the method used in the calculation, both figures being as at 1st January, 1945.
Mr. H. Stevens-Guille	311 - 361 billion cubic feet, depending upon abandonment factors, both figures being as at 1st January, 1944.

The percentage of variation is relatively small.

Dr. Katz subsequently prepared and submitted in evidence an analytical comparison of the estimates made by



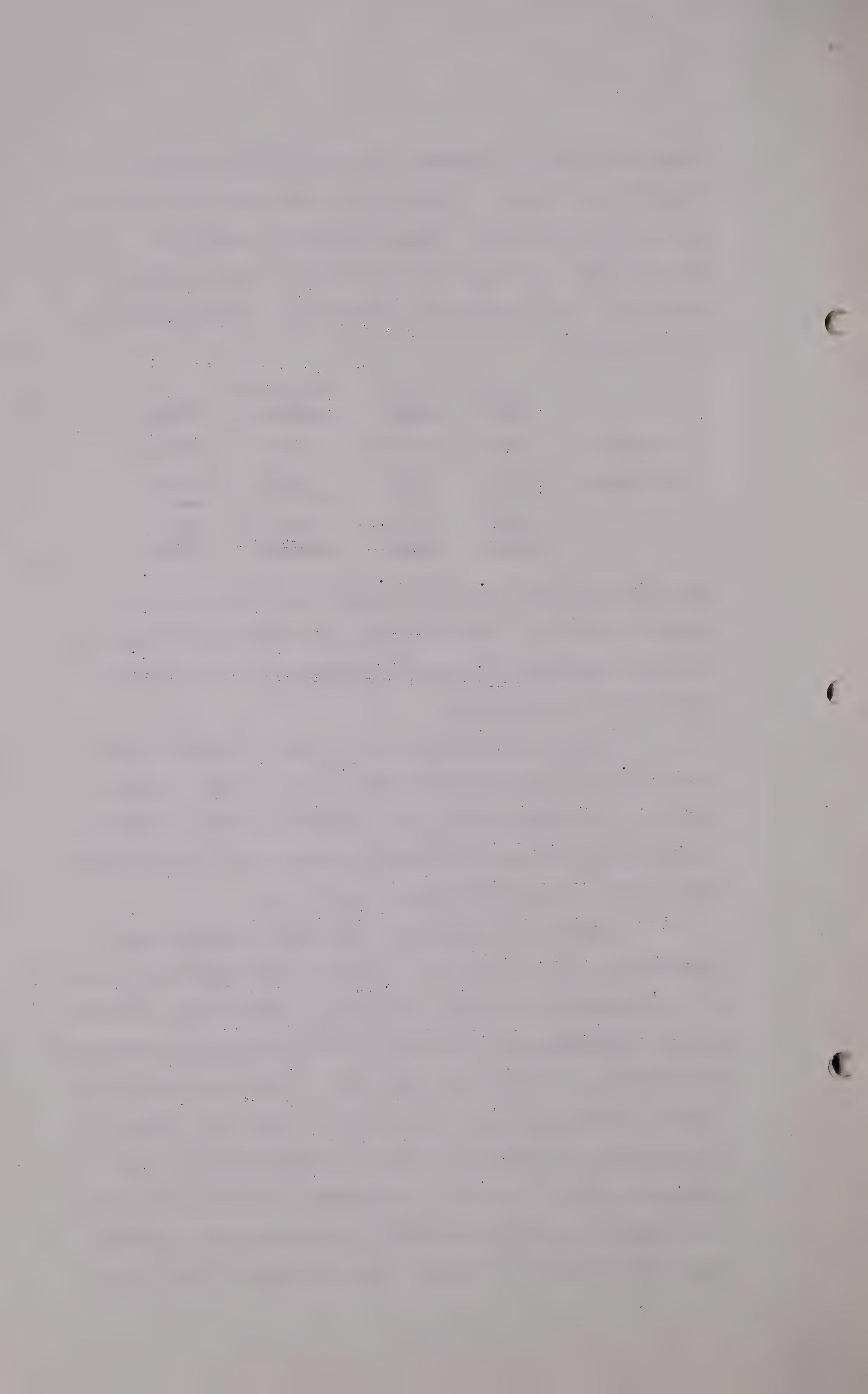
himself and other witnesses. The following reserve estimate represents, in his opinion, the mean of the best information available. These reserves - as at 1st January, 1945 - are given in billions of cubic feet of residue gas at 14.4 pounds pressure and a temperature of 60° Fahrenheit:

	<u>B.A.</u> <u>Area</u>	<u>G.O.P.</u> <u>Area</u>	<u>Royalite</u> <u>Area</u>	<u>Total</u>
Gas cap	22.5	14.4	170	206.9
Oil area	23	8.6	107	138.6
	<u>45.5</u>	<u>23.0</u>	<u>277</u>	<u>345.5</u>

These figures are based principally upon Mr. Stevens-Guille's evidence. They are 11.5 per cent higher than the reserves calculated by material balances or any methods known to be conservative.

In the case of Madison, it may be necessary to determine the reserves as at 1st January, 1944. During that year, 15.974 billion cubic feet of gas were delivered to the market so that the total reserves as at 1st January, 1944, would be 361.558 billion cubic feet.

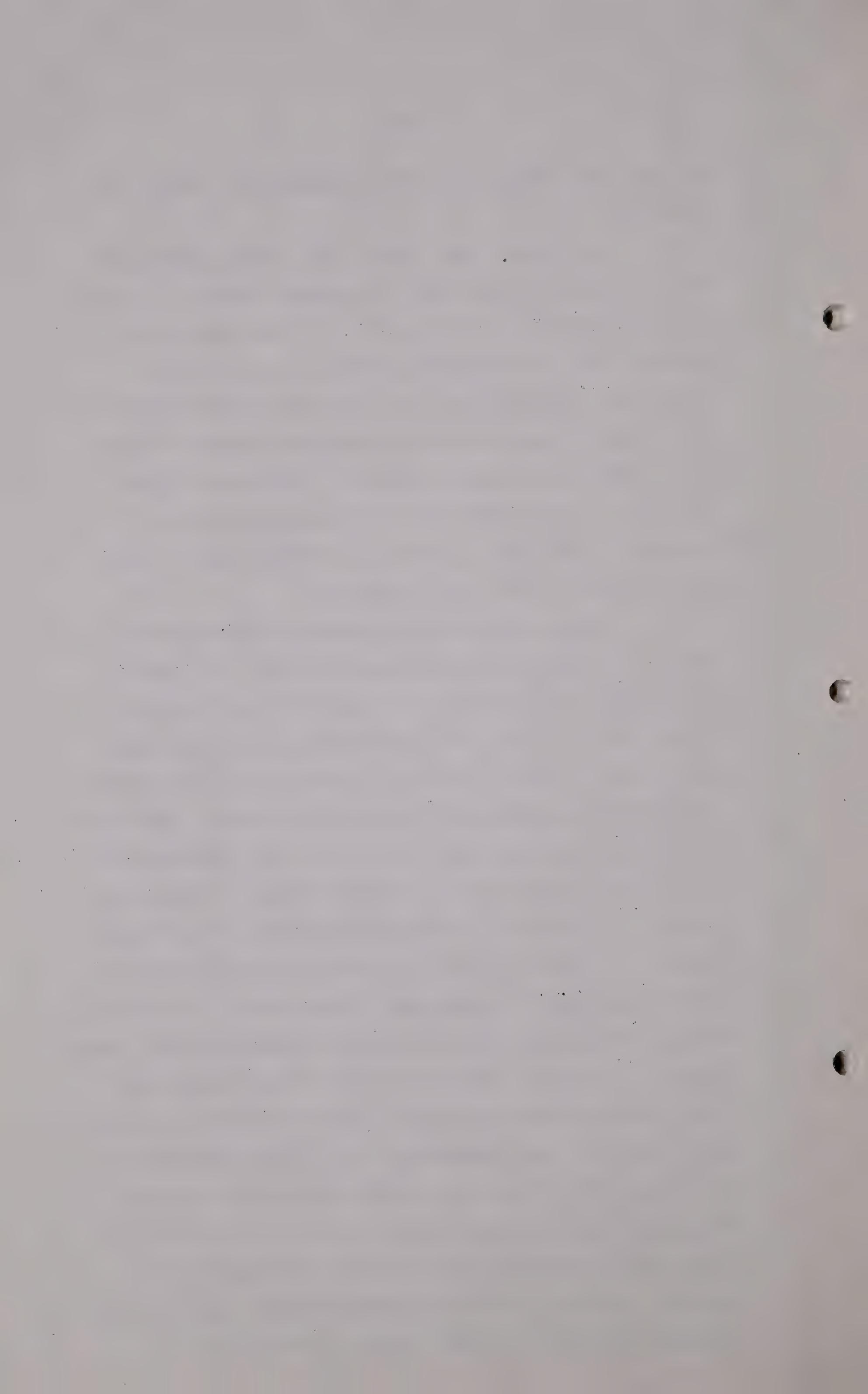
Again at a later date, Dr. Katz revised his estimate and the revised figures were read into the record of the proceedings without objection. The revised estimate reduced the marketable reserves in the Gas and Oil Products' area by three (3) billion cubic feet, leaving a final total figure of 342.5 billion cubic feet for the whole field. It becomes necessary for the Board to decide which of the foregoing estimates should be adopted, for the reason that depreciation rates to be allowed to the utility companies operating in the field depend upon the life of the field



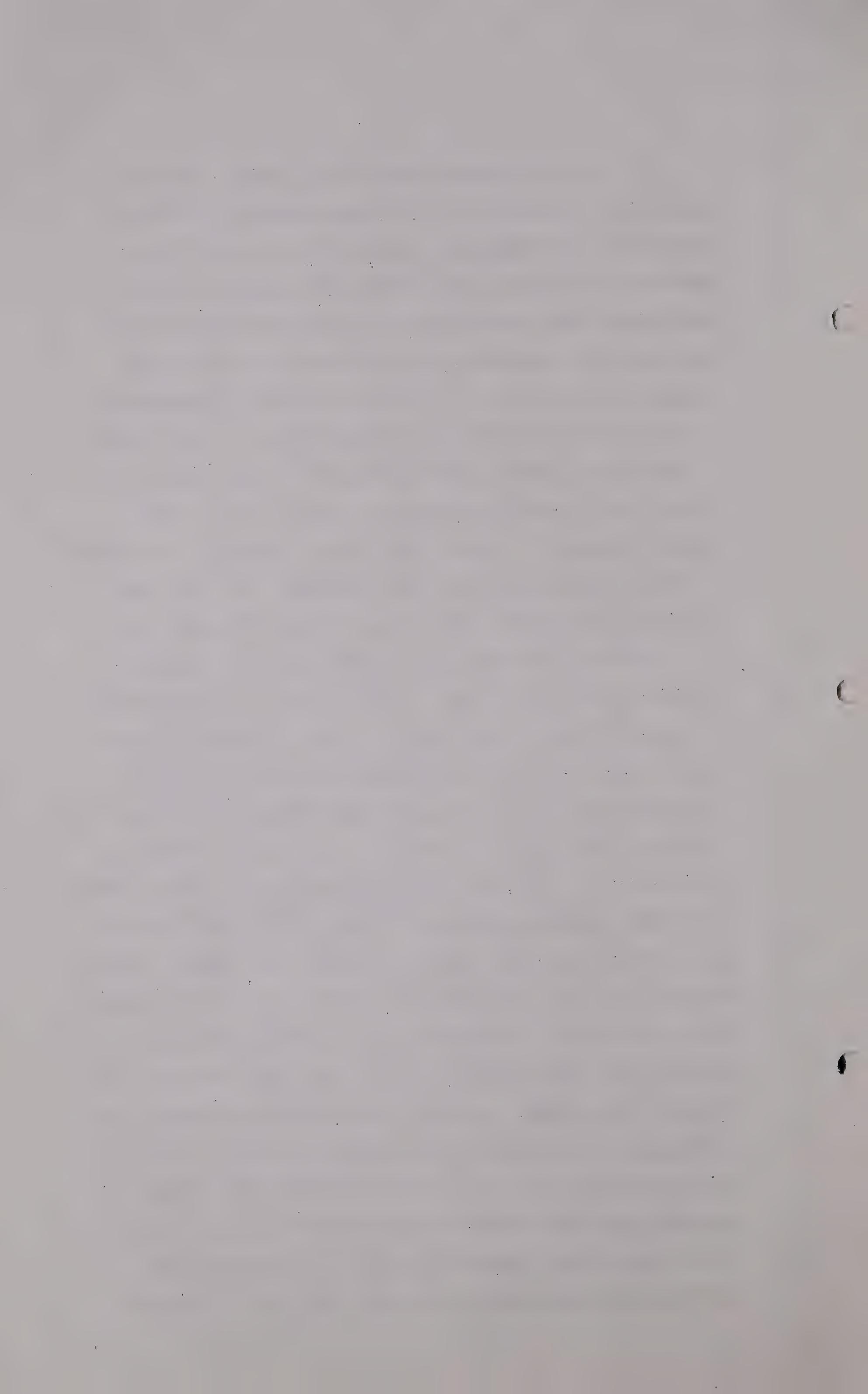
and that must depend upon total reserves and annual consumption.

As will be seen later, all parties agreed that the unit method in the case of a wasting asset is a proper method of computing depreciation. If marketable gas reserves are over-estimated, there is a possibility (using unit depreciation) of a loss to utility companies at the end of the field's life (subject perhaps to salvage) while, on the other hand, if reserves are under-estimated, depreciation will be accelerated and the consumer in the early years may be called upon to pay a price for gas which is not warranted.

Counsel for Canadian Western suggested the wisdom of using a gas reserve smaller than the amount recommended by Dr. Katz as the basis for calculating future depreciation, but thought that when determining rate bases, Dr. Katz' estimate might be used for computing accrued unit depreciation to the present time. This suggestion, however, was made, subject to the condition that the resultant price for gas sold by Madison to Canadian Western would be within the present price of 7 3/4 cents per M.c.f. It was further suggested that 250 billion cubic feet would be appropriate, which figure is approximately seventy per cent of Dr. Katz' recommendation. That reserve, if adopted, would accelerate depreciation and would increase total operating costs, resulting in a higher price for gas, and conversely, rates to the consumer in the later years of the life of the field might be very much less than present estimated rates. It is true that accelerated depreciation would speed the recovery of invested capital and that in time probably would call for further adjustment in other phases of operation.



In the determination of all rates, the Board is charged by the Statute to fix rates which are just and reasonable. In doing so, it cannot have regard only to the ideal of keeping rates within the present compass - rates which were arrived at on a bargaining basis at a time when the production of gas from Turner Valley was unrestricted and when production amounted approximately to five times the amount of market demand. Under orders of the Board, large sums of money have been expended to ensure such conservation measures as will secure the minimum wastage of natural gas and at the same time furnish a market sharing position for producers. As the Board apprehends its responsibilities, it must determine just and reasonable rates wherever possible on the evidence adduced before it and not, if avoidable, on any arbitrary or judgment basis. In relation to gas reserves, it has the evidence of skilled engineers who arrived at their results by well known and presently recognized engineering methods. The evidence is that all of the estimates are conservative. The high is 361 billion cubic feet, arrived at by Mr. Stevens-Guille and the low is 309 billion cubic feet arrived at by Mr. Stanley Davies. Dr. Katz' estimate was 317 billion cubic feet, and if he is correct in saying that his estimate is probably low by twenty per cent, then his possible reserve figure would be in the order of 380 billion cubic feet. Counsel for the City of Calgary did not suggest that the estimate submitted by Mr. Davies - called by the City - of 309 billion cubic feet should be adopted possibly because depreciation on the unit basis would thereby be accelerated and the charges to the ultimate consumer might increase. The fact is that no



serious attack was made on Dr. Katz' final estimate and since it is based upon scientific principles and since, in view of the magnitude of all the figures submitted, it is reasonably in accord with all other estimates, the Board will adopt the figure of 358.558 billion cubic feet as at 1st January, 1944, as the marketable reserves in Turner Valley. The figure as at 1st January, 1945, is 342.5 billion cubic feet.

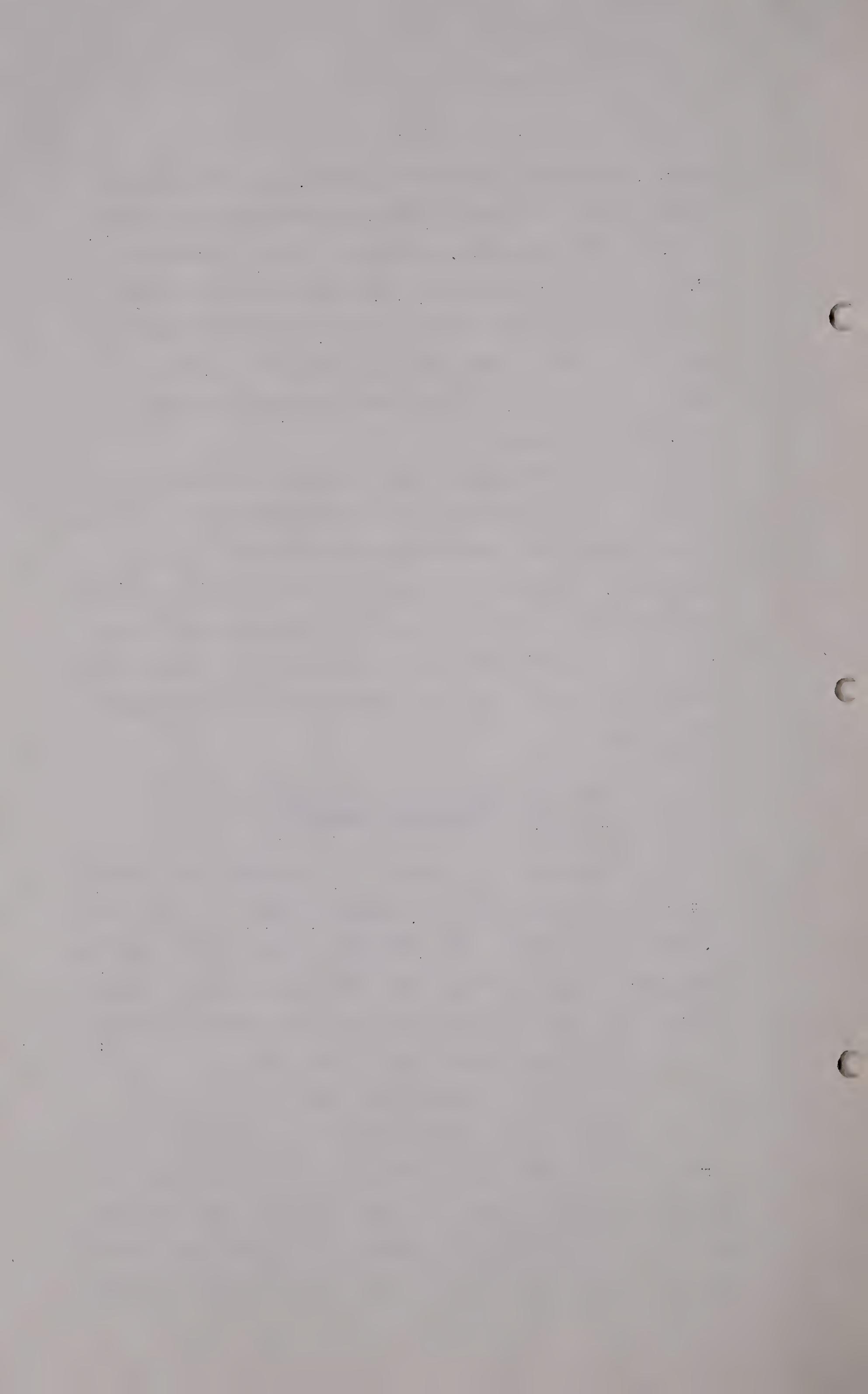
On this phase of the inquiry, it remains to be said that the evidence respecting gas migration to or from the gas cap is too indefinite upon which to found any conclusion respecting the benefits which may accrue to oil producers. The available evidence indicates that the gas cap in the Royalite section of the field is a closure with little permeability so that migration, if any, will be negligible.

GAS RESOURCES OF THE PROVINCE OTHER THAN  
IN TURNER VALLEY

Evidence was given on this aspect of the inquiry by three geologists, Mr. S. E. Slipper, Mr. J. B. Webb and Mr. John O. Galloway. Mr. Slipper, a Consultant Geologist, dealt in a general way with the various gas fields throughout the province, dividing them into two classes, namely:

- (1) the plains region gas; and
- (2) the foothills region gas.

The witness discussed these two areas in general terms and described the various geological formations to be found in each of them, but specifically dealt with the problem of securing additional supplies of gas for Canadian Western system. He considered that when the Turner Valley

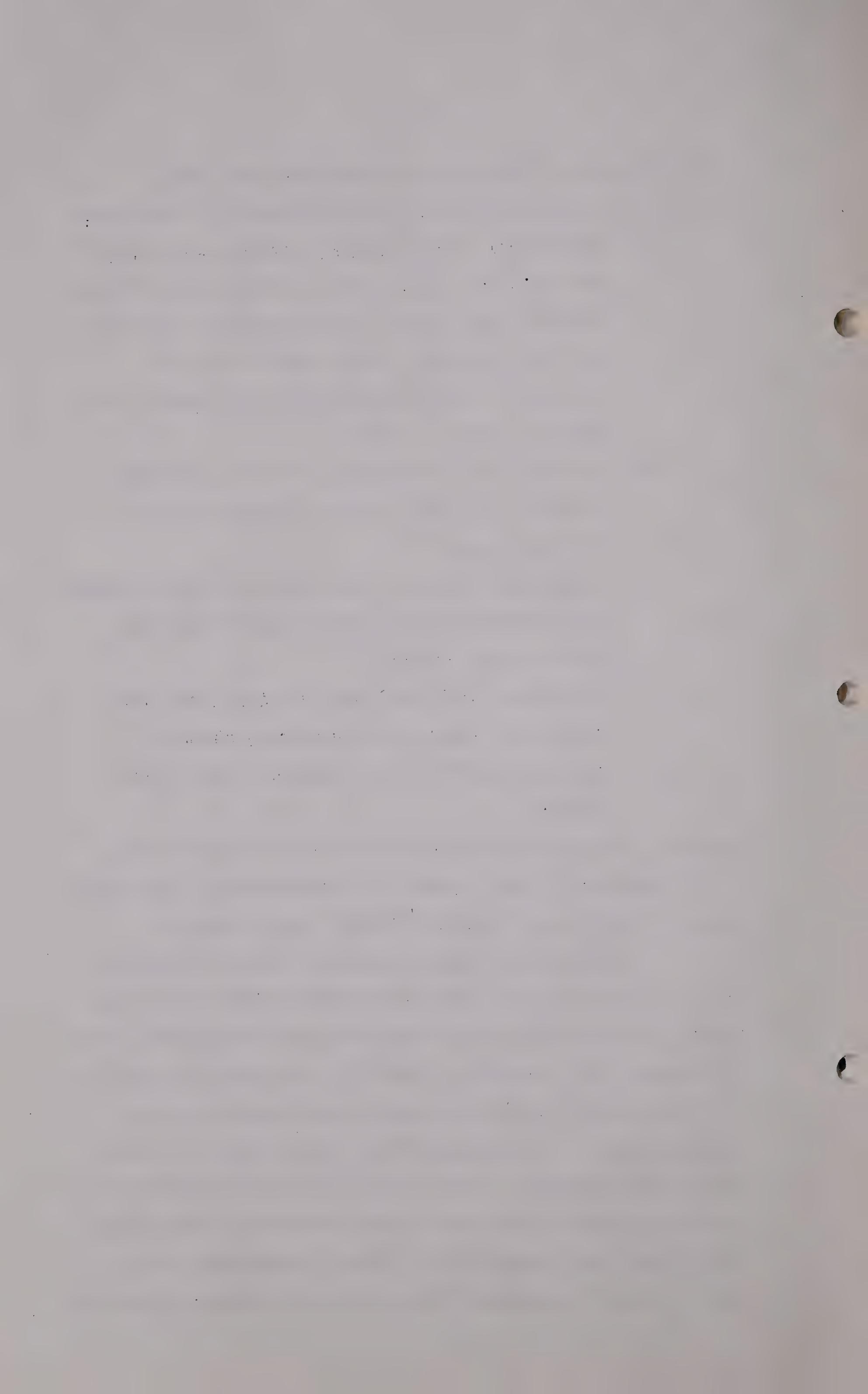


field declines in delivery capacity and when fresh supplies are called for, such supplies could be obtained:-

- (1) by projecting the Foremost terminus of Canadian Western's gas line, south to known United States boundary gas fields in the Blackleaf, Ellis and Sunburst horizons; these fields could be developed to add materially to the needs of the Canadian Western system;
- (2) by extending the Burdett end of the Canadian Western line north, to tap supplies in the Steveville area;
- (3) by securing supplies from the Foothills structure west of Calgary and in the Jumping Pound and Moose Mountain areas;
- (4) by securing supplies through a pipe line connecting the Edmonton and Calgary systems;
- (5) some probable foothills fields north-west of Calgary.

He was of the opinion that there was no cause for alarm that Canadian Western's system would be without sufficient gas to meet market demand as Turner Valley declines.

The witness gave no specific figures respecting available reserves in these areas except from the Viking and Kinsella fields, lying approximately one hundred miles south-east from Edmonton, from which supplies for the City of Edmonton and intervening points are secured at the present time. He estimated that the reserves in these two fields amounted to 600 billion cubic feet and stated that he believed this amount could be added to materially by further development into potential extensions of the two fields. He computed the reserves by decline production



against pressure drop and his figures were calculated down to zero pressure. Using an abandonment pressure of 100 pounds, the recoverable reserves would be 500 billion cubic feet. It would seem as if the limits of these two fields have not yet been determined and that the reserves mentioned might be added to materially by further development.

Mr. Webb, a geologist in the employment of Imperial, summarizes the probable reserves, possible reserves and prospective areas as follows:

- (a) Viking 75,160,000 M.c.f. to 100 pounds abandonment pressure
- (b) Kinsella 130,000,000 M.c.f. to 100 pounds abandonment pressure
- (c) Foremost 17,600,000 M.c.f.
- (d) Bow Island 13,000,000 M.c.f.

The two latter fields are controlled almost entirely by Canadian Western, and need not be considered.

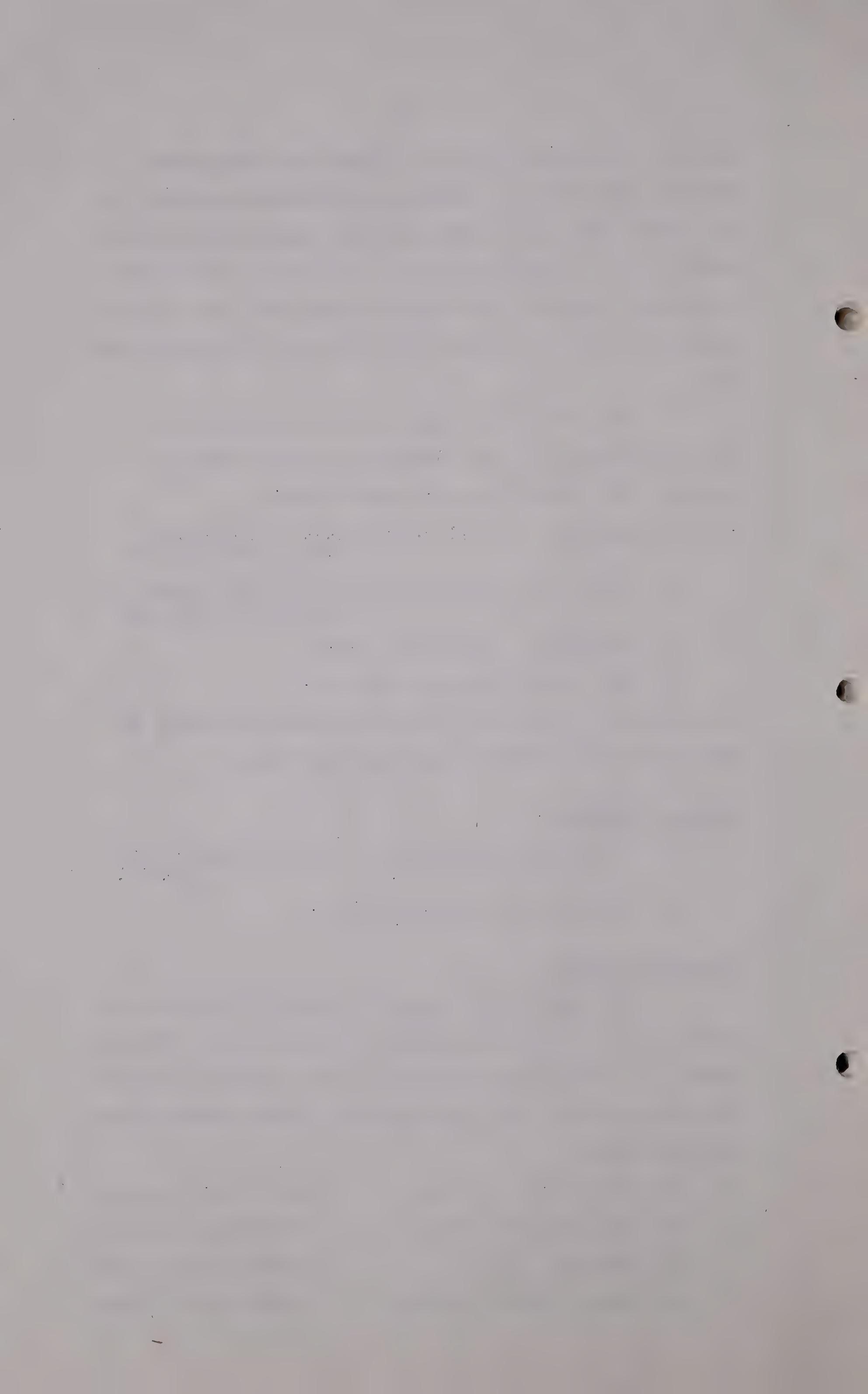
Possible Reserves:

- (e) Viking-Kinsella, possible extension 100,000,000 M.c.f.
- (f) Princess - 80,000,000 M.c.f.

Prospective areas:

The following prospective areas are undeveloped or are indicated by only one or two wells and the witness considered that it was impossible at this time to estimate the reserves which might be proved by further investigation and development:

- (1) Steveville - 1 well 12,000 M.c.f. per day
- (2) Rainy Hills - 1 well 7,000 M.c.f. per day
- (3) Pinhorn - 1 well 11,600 M.c.f. per day
- (4) Pinhorn East - 2 wells 16,250 M.c.f. per day



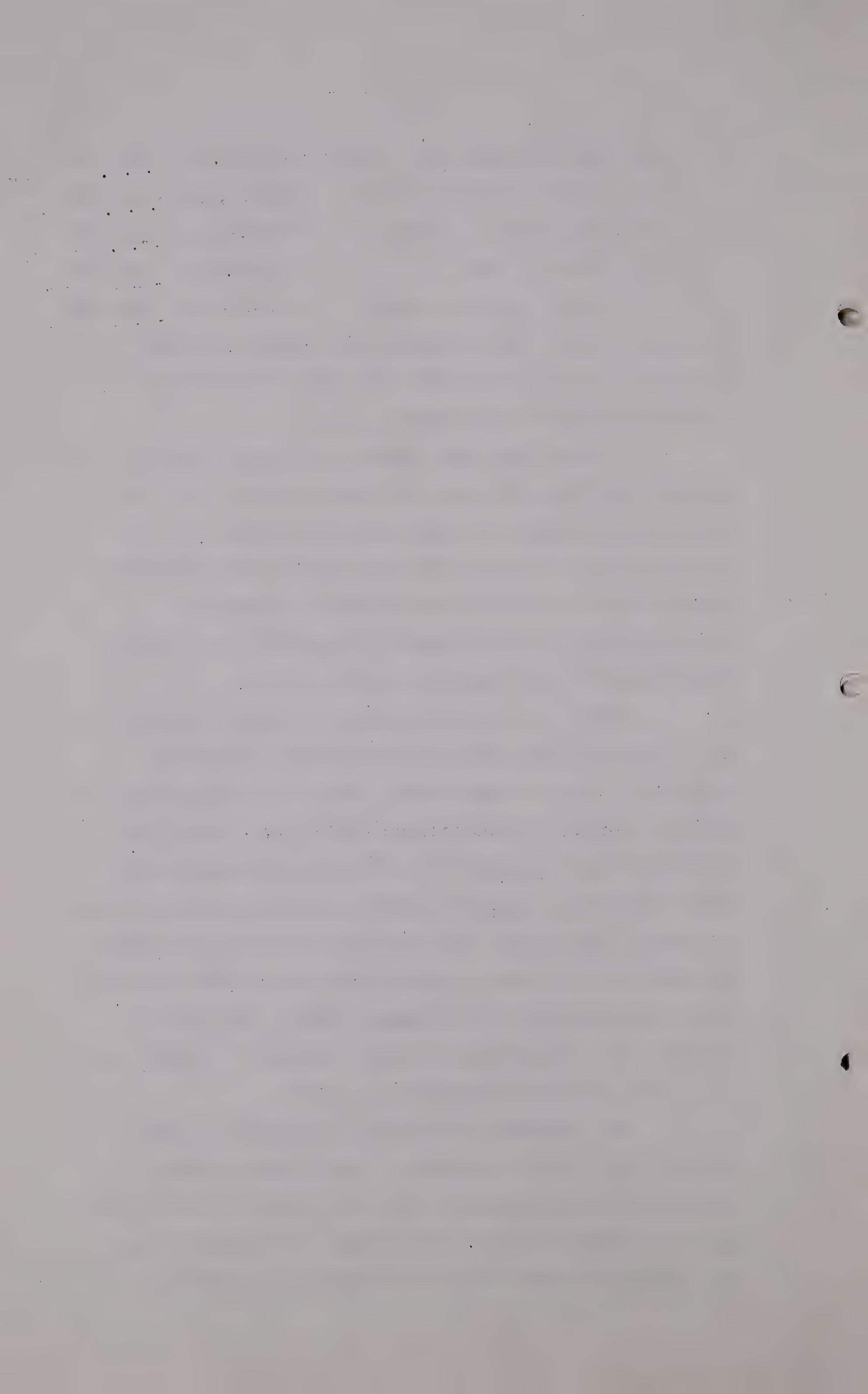
(5)	Dead Horse Coulee - 1 well	50,000 M.c.f. per day
(6)	Erickson Coulee - 1 well	10,000 M.c.f. per day
(7)	Eagle Butte - 1 well	20,000 M.c.f. per day
(8)	Taber - 1 well	6,000 M.c.f. per day
(9)	Jumping Pound - 1 well	13,500 M.c.f. per day

It is well known that two additional wells have been drilled in the Jumping Pound area (west from Calgary) since this evidence was given.

The witness gave detailed evidence respecting the geology and the development of these various fields and respecting his method of calculating reserves. In the Princess field he was of the opinion that the recoverable reserves compared with total reserves amounted to 40,000,000 M.c.f., which amount represents only a three year supply for the Canadian Western system.

There is a wide divergence of opinion between Mr. Slipper and Mr. Webb respecting Viking-Kinsella reserves. Using an abandonment pressure of 100 pounds, Mr. Slipper's figure is 500 billion cubic feet, against Mr. Webb's 205 billion cubic feet, although the latter considers that these reserves might be increased by 100 billion if further development is undertaken. Mr. Slipper places the area of these two fields at 200 square miles while Mr. Webb places the area at 74 square miles. The latter agreed that if Mr. Slipper's areal content is correct, so would his calculated reserves be correct.

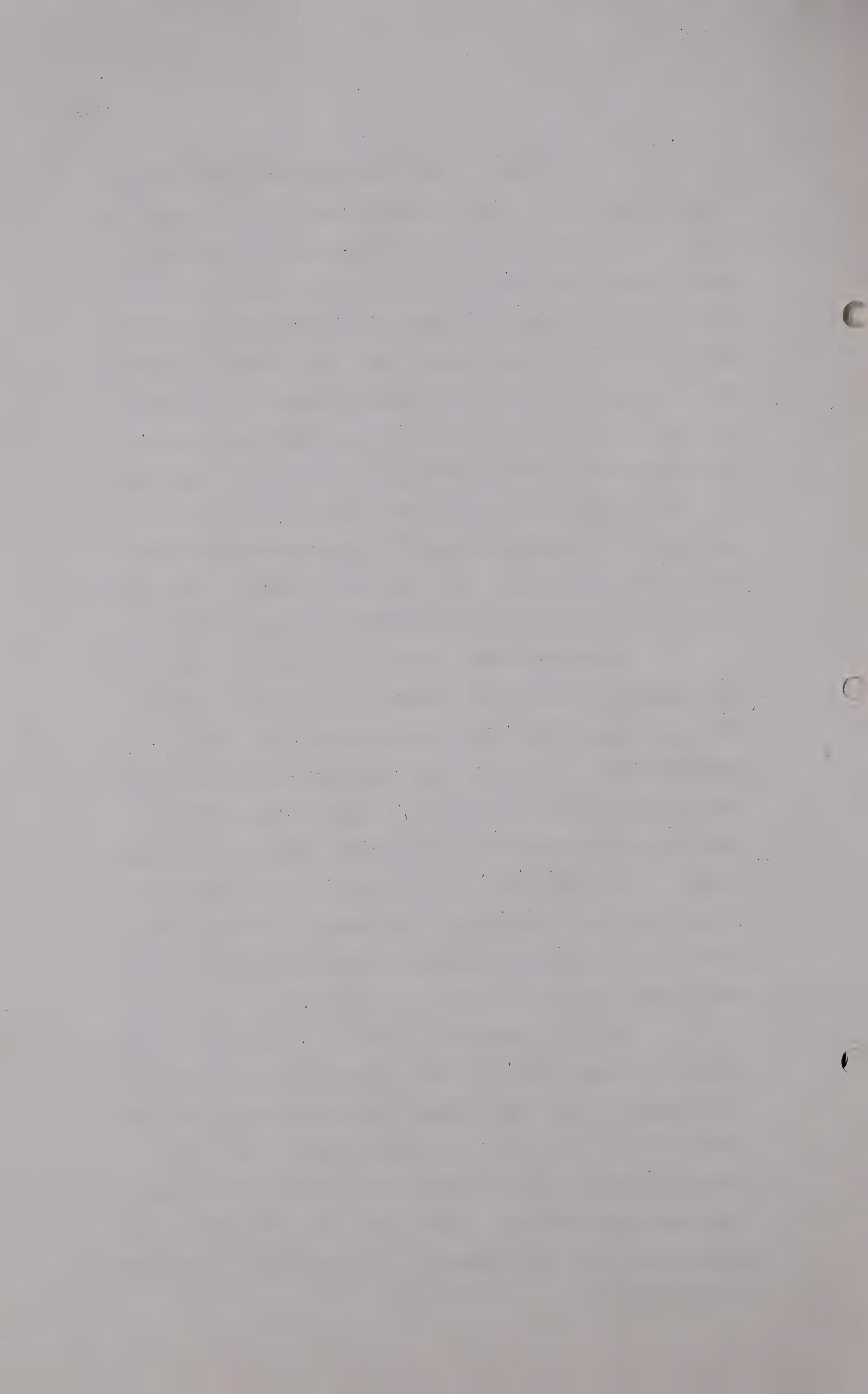
Mr. Galloway restricted his evidence to the Princess and Steveville areas. The Princess field is approximately sixty miles north from the Bow Island Field and from Canadian Western's southern transmission line. His evidence is that there are several gas producing



horizons in this field. The gas contains little if any sulphuretted hydrogen and scrubbing would not be required, but it is possible that dehydration might be necessary. He estimated that using an abandonment pressure of 100 pounds, the recoverable reserves in the Sunburst horizon amounted to 100 billion cubic feet. In a lower formation gas was encountered and the particular well produced at the rate of 60 million cubic feet per day with a shut in pressure of 1975 pounds. He was of the opinion that the Sunburst horizon was capable of supplying the total requirements of Canadian Western's system and that several times 100 billion cubic feet could be recovered from other zones and from the Sunburst horizon in other locations.

It appears that in the Sunburst zone where wells have already been drilled, there is a danger of water intrusion unless the wells are produced under good operating field practice. Mr. Galloway believed that he could deliver gas into Canadian Western's system at a cost comparable with that now paid for Turner Valley gas, namely, 7 3/4 cents per M.c.f., but on cross-examination he admitted that no detailed calculation had been made. His figure was based entirely upon prospective revenue, and without reference to cost of gathering and delivery.

There is substantial conflict between Mr. Webb and Mr. Galloway respecting the recoverable reserves in the Princess field. The former says 40 billions and the latter 100 billions from the Sunburst zone. Mr. Webb indicated that the other zones in this field were no more than possible productive zones, while Mr. Galloway considered that the other zones would be more prolific than the Sunburst.

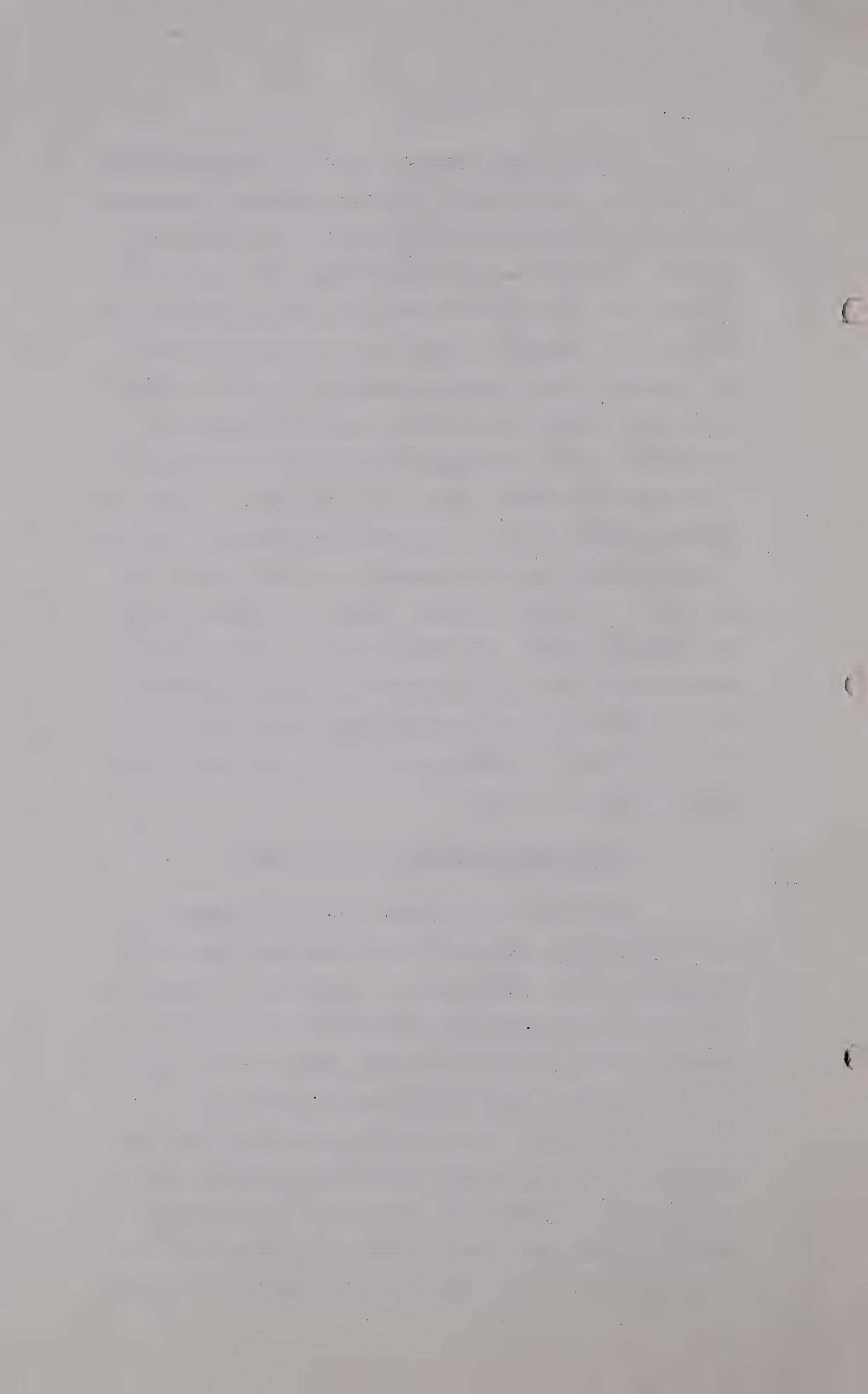


What is quite clear is that the Viking-Kinsella and Princess fields contain immense quantities of natural gas but the Board at the moment does not feel that it is called upon to make any precise finding with respect to either field. From the evidence given by Mr. Slipper, Mr. Webb and Mr. Galloway, it would appear that apart from all the major fields already discussed, including Turner Valley, there are in this province potential reserves which can, if need be, supply the present market demands of the Canadian Western system for many years. That conclusion, however, has no relationship whatever to the cost of making these supplies available or to the price to be paid by the ultimate consumer. These are matters which must await the event. At the same time, if the economic law of supply and demand is applied, it is obvious that present supply greatly exceeds present demand and that factor is of some importance in relation to the well-head price hereafter discussed.

#### PRESENT AND ESTIMATED FUTURE DEMAND

Evidence on this phase was given by Frank A. Brownie, Executive Assistant to the Managing Director of Canadian Western. Exhibit 54 is a statement of estimated daily peak loads of the Gas Company's system proper and of connected loads for the period from 1945 to 1970, inclusive, the figures given being in millions of cubic feet.

The figures must necessarily be estimates based upon past experience and reasonable probabilities for the future. The statement shows the annual seasonal load requirements for the Company's system in Calgary and for towns served by it, but excluding the load of the Alberta



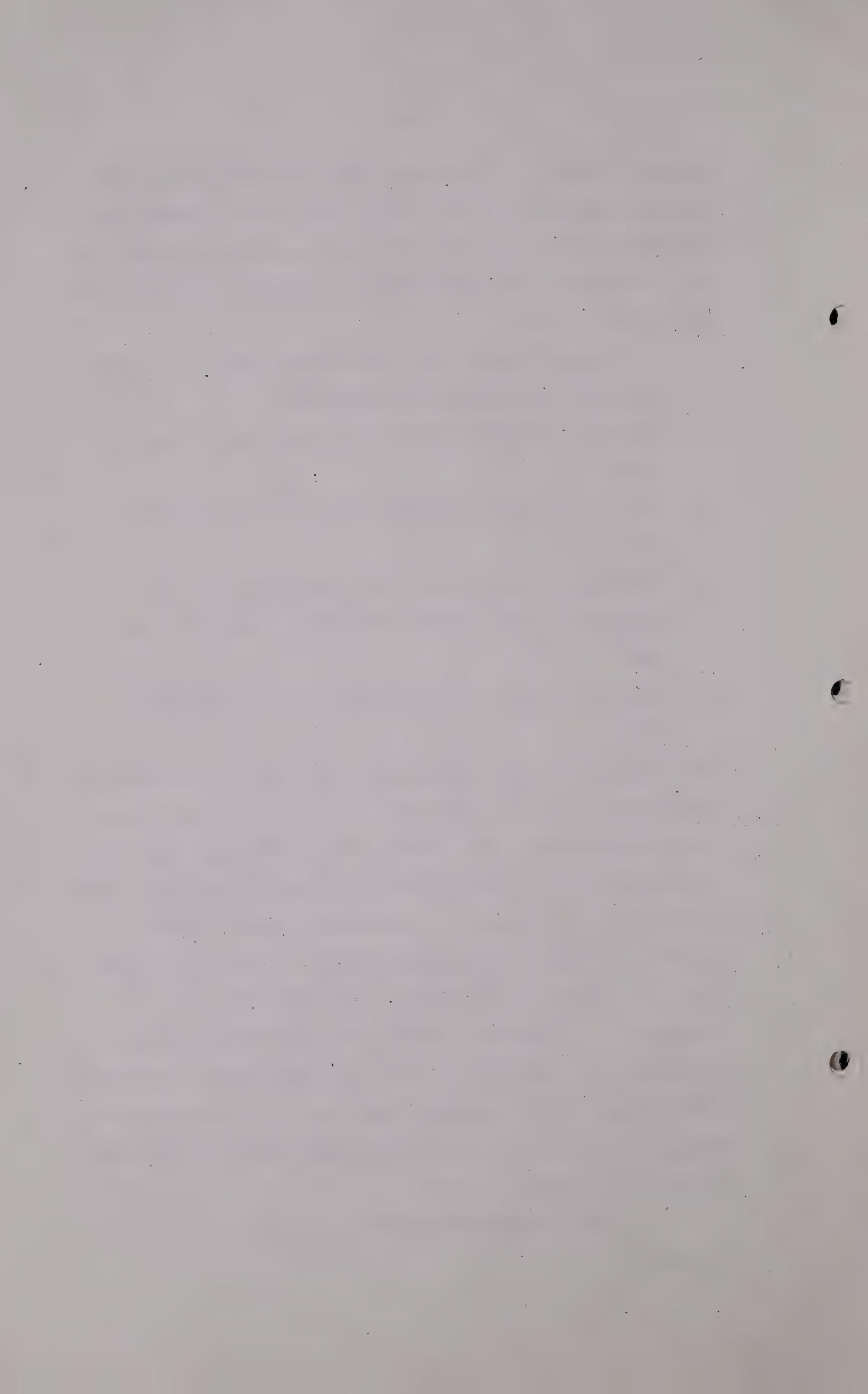
Nitrogen Company. The figure for the year 1945 for the Company's system is 95.4 million cubic feet, which figure declines to 80.8 million cubic feet for the years 1947 to 1950, inclusive, and then slowly increases to 97.6 million cubic feet by 1970.

These figures were predicated (at the time they were prepared) upon certain assumptions:

- (1) That the European War would be over at the end of 1944.
- (2) That the Pacific War would be over by the end of 1945.
- (3) That the years 1946 and 1947 would be years of transition with pre-war stability established by 1948;
- (4) That the Nitrogen Company demand would cease in 1947.

Apart from these assumptions, which at that time were not unreasonable and the first two of which turned out to be reasonably accurate, all other relevant factors were taken into consideration and entered into the calculations which produced the results above indicated. The productive capacity of the Bow Island and Foremost Fields is between 15 and 20 million cubic feet per day but only for short periods in each year and it was estimated that if these fields were called upon for a daily supply each year, their combined productive capacity might only be one-half of the above amounts. The fact is that these fields are reserved for peak load periods only.

The witness submitted the following percentages of demand:



	<u>Domestic</u>	<u>Commercial</u>	<u>Industrial</u>
1929	62	17	21
1939	54	30	16
1944	42	36	22

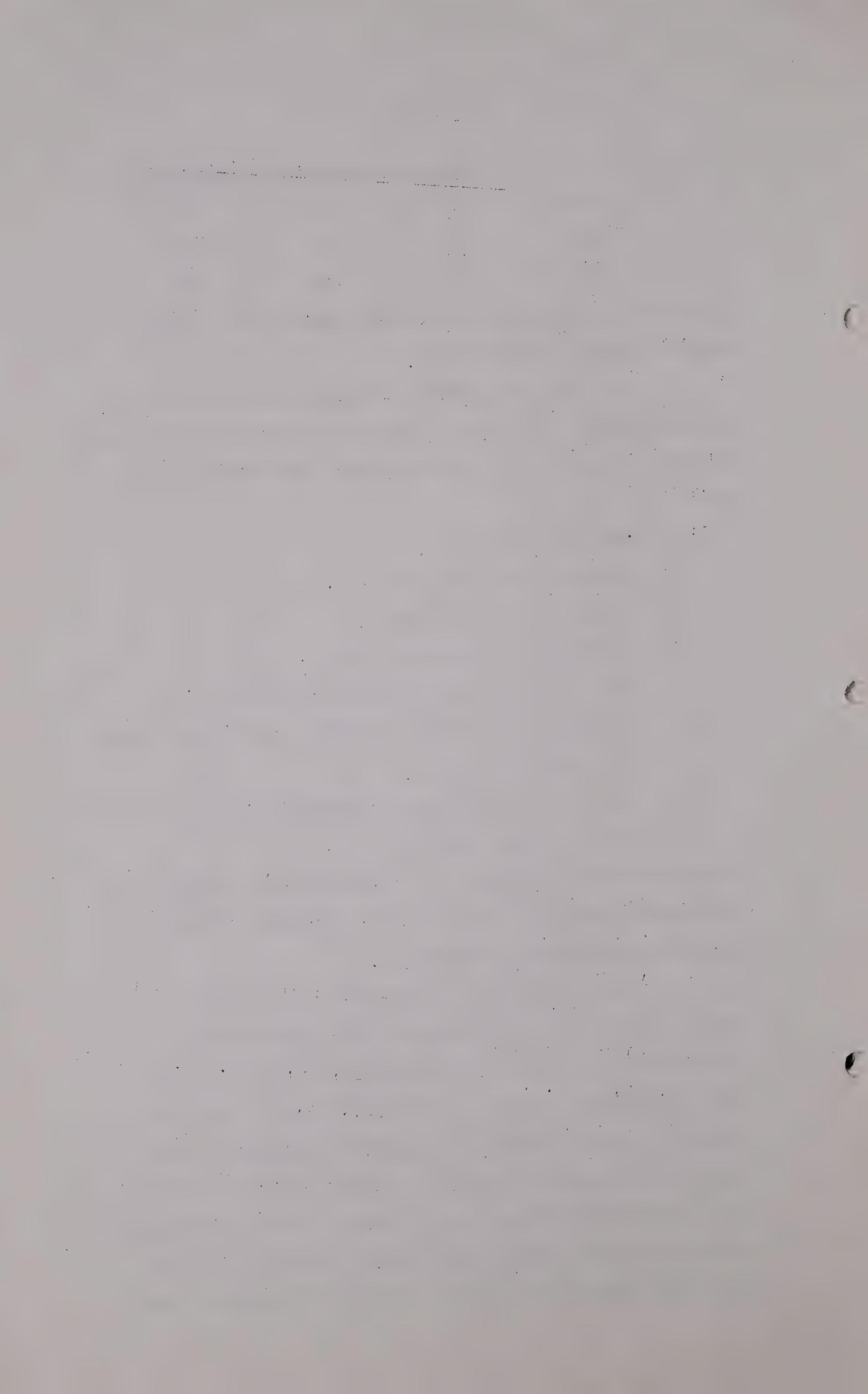
The above figures do not include Imperial Oil or the Ammonia Company requirements.

Mr. H. Le M. Stevens-Guille also gave evidence on this point. The markets for the purposes of estimating present and estimated future demand were stated by him to be:

- (1) Canadian Western.
- (2) Alberta Nitrogen Company.
- (3) Imperial Oil Refinery.
- (4) Valley Gas Company Limited.
- (5) The Valley Pipe Line Company Limited.
- (6) Royalite Oil Company Limited, for domestic fuel in Turner Valley.
- (7) Gas and Oil Refineries Limited, for use in its Turner Valley refinery.

Mr. Stevens-Guille adopted Mr. Brownie's load figures for the Canadian Western system proper, Imperial Refinery and the Alberta Nitrogen Company.

A table appended to Exhibit 55 shows total annual requirements from 1944 to 1974 varying from 16,057,300 M.c.f. in 1944 to 12,526,700 M.c.f. in 1974, with a cumulative total of 369,124,600 M.c.f. It was assumed in these computations that the Ammonia Company demand would cease at the end of 1946; that the Valley Pipe Line Company demand would cease in 1960 and that Gas and Oil Products demand would cease in 1950. If G.O.R. fuel requirements are not to be considered part of the



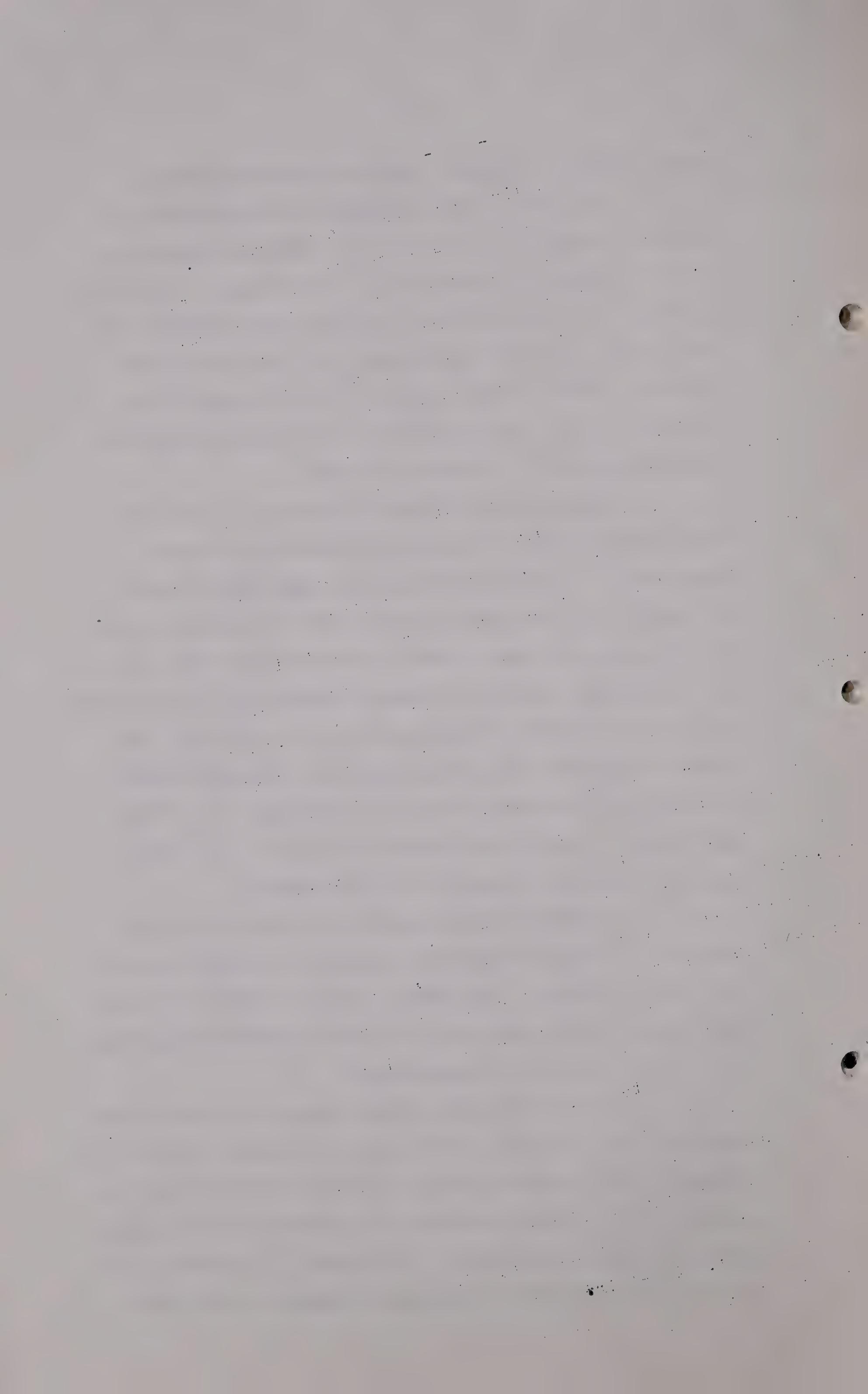
market demand, a deduction would be made accordingly.

The relationship of Alberta Nitrogen Products Limited to market demand is of considerable importance. Mr. J. R. Donald, representing the Department of Munitions and Supply of the Dominion Government, gave evidence in April 1945. The plant was constructed in 1940 by the Dominion Government for the production of ammonia and ammonium nitrate for war purposes, natural gas being the basic raw material for these products.

Subsequently, a large proportion of the plant output was utilized for the manufacture of nitrogen fertilizer to meet the serious world shortage of that commodity. The witness estimated that the shortage would continue for two years after the termination of the European War and perhaps longer. He felt, however, that the existing demand would cease with the termination of the war with Japan. The plant can produce the total Canadian demand for fertilizer in three months so that when world stocks are built up again, the future of the plant will depend upon its ability to compete in world markets.

Operated at full capacity, it uses 9,000,000 cubic feet per day, and is the largest consumer of gas in the Calgary market. The present price is seven (7) cents per thousand cubic feet and Mr. Donald expressed the hope that that price could be maintained.

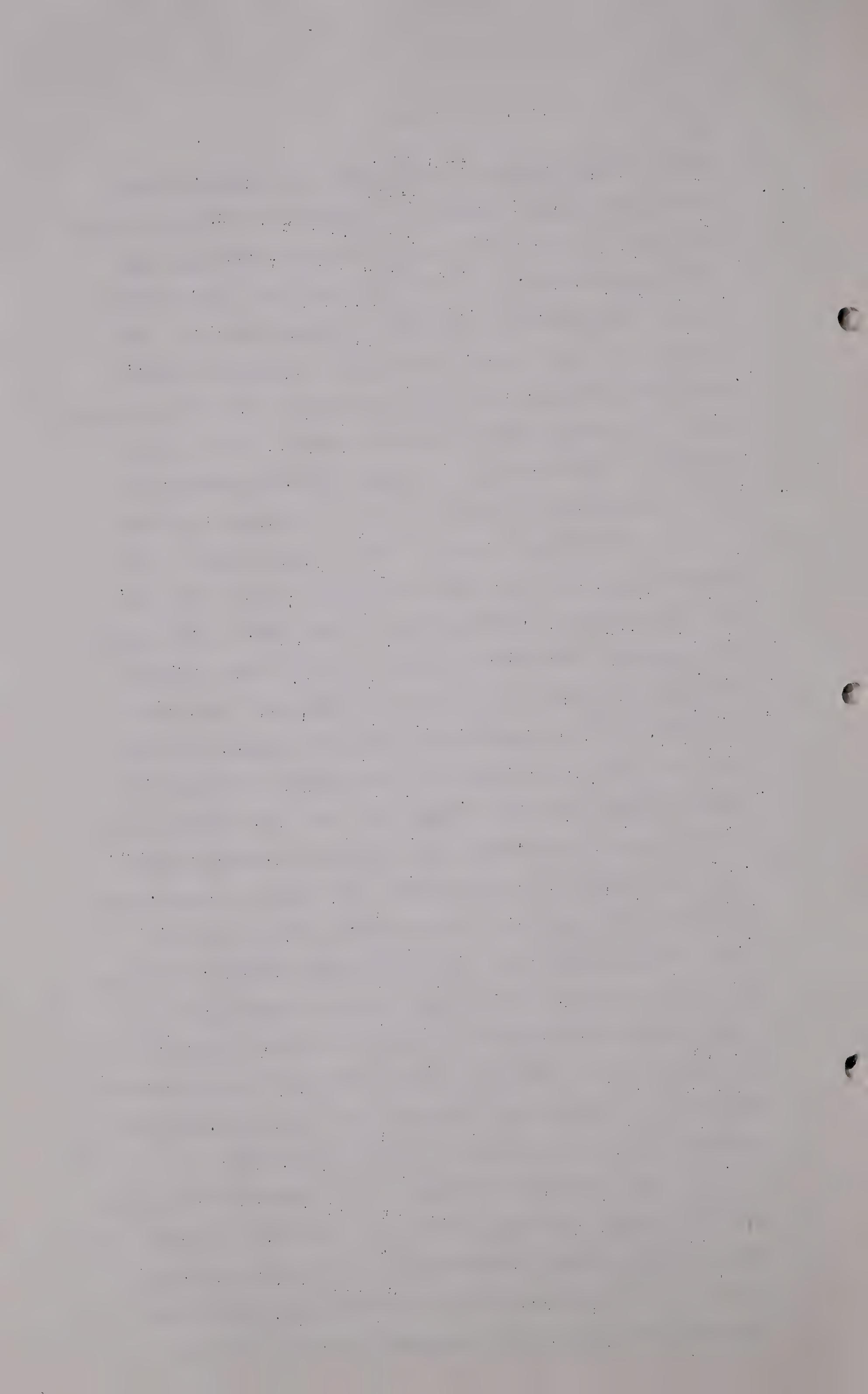
In April 1946, Mr. Colls, Manager of the Chemical and Fertilizer Division of Consolidated Mining and Smelting Company (which company formerly operated and now owns the plant), gave evidence respecting the estimated future gas requirements for the plant. One-third of the ammonia output is manufactured into ammonium nitrate in fertilizer



form, and the balance of the output is shipped to other points for further processing. Fertilizer shipments from the plant show that in each of the years 1944 and 1945 the Canadian market absorbed five per cent and thirteen per cent respectively, the British Empire 46.4 per cent and 2.2 per cent respectively, United States of America and possessions 48.6 per cent and 44 per cent, respectively, while in 1945 the balance was absorbed by other foreign countries. These figures indicate the fluctuations in volume and locale of demand for this company's products.

Two points emerge. First, the effect on the wholesale price of gas should the plant cease operating and the repercussions therefrom on the retail market price, and secondly, the effect on the future of the chemical industry and industry generally in Alberta. The Board must point out that it has a statutory duty to fix just and reasonable prices for gas produced and processed in Turner Valley and, while those just and reasonable prices may be viewed in light of their effect on market demand and consequently on market price, the Board's primary duty is to the whole natural gas industry in Turner Valley. Other considerations are collateral only and must not have too much influence on the final result. This plant was constructed primarily for war purposes which purposes have now been served, unless it can be said that the manufacture of ammonium nitrate into fertilizer for use in devastated countries is a continuation of the war problem.

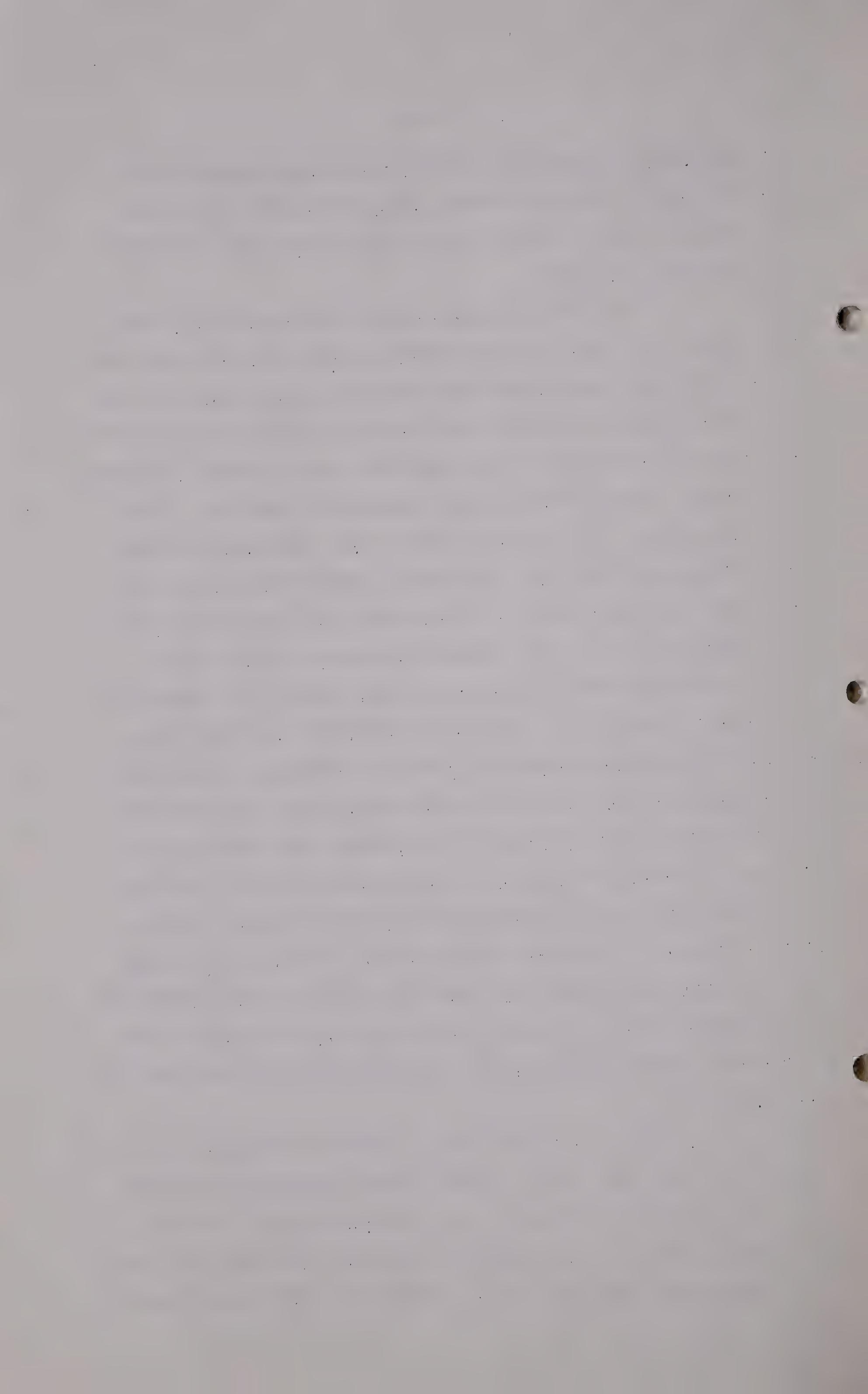
Mr. Colls stated that it was reasonable to expect that the plant would operate at full capacity for from three to four years from the date on which he was giving evidence. In arriving at this estimate, he made a computation respecting world requirements and fertilizer



shipments. American plants are now being converted to fertilizer production and in the course of time Europe will be able to supply its own demand and will again be exporting abroad.

If the estimated life of the plant is correct, then there would be approximately three billion cubic feet of gas per annum used which otherwise would require to be repressured. Schedules were submitted showing the relative result in operating costs and the price which the producers would receive if the plant remained in operation. These schedules, while quite valuable, were based upon certain assumptions and they only have a relative but not a conclusive value and it is, therefore, not proposed to discuss them in detail. The valuable evidence is that in all probability the ammonia plant will continue to operate at full capacity for a period of from three to four years, and the Board, therefore, feels justified in holding that the company's annual load will be required until the end of 1948. At that time, if not before, the whole question will require re-examination and perhaps revision and by that time it is possible that the world demand for fertilizer will continue or that other branches of chemical industry will have been developed, calling for substantial volumes of gas for use in this plant at prices which the producers in Turner Valley can be directed by the Board to accept.

Mr. Colls declined to indicate the maximum price which the plant could afford to pay for gas at this time and it may be that after the wholesale price of gas has been fixed and new schedules have been prepared, the owners may decide that the price is more than they can pay and at

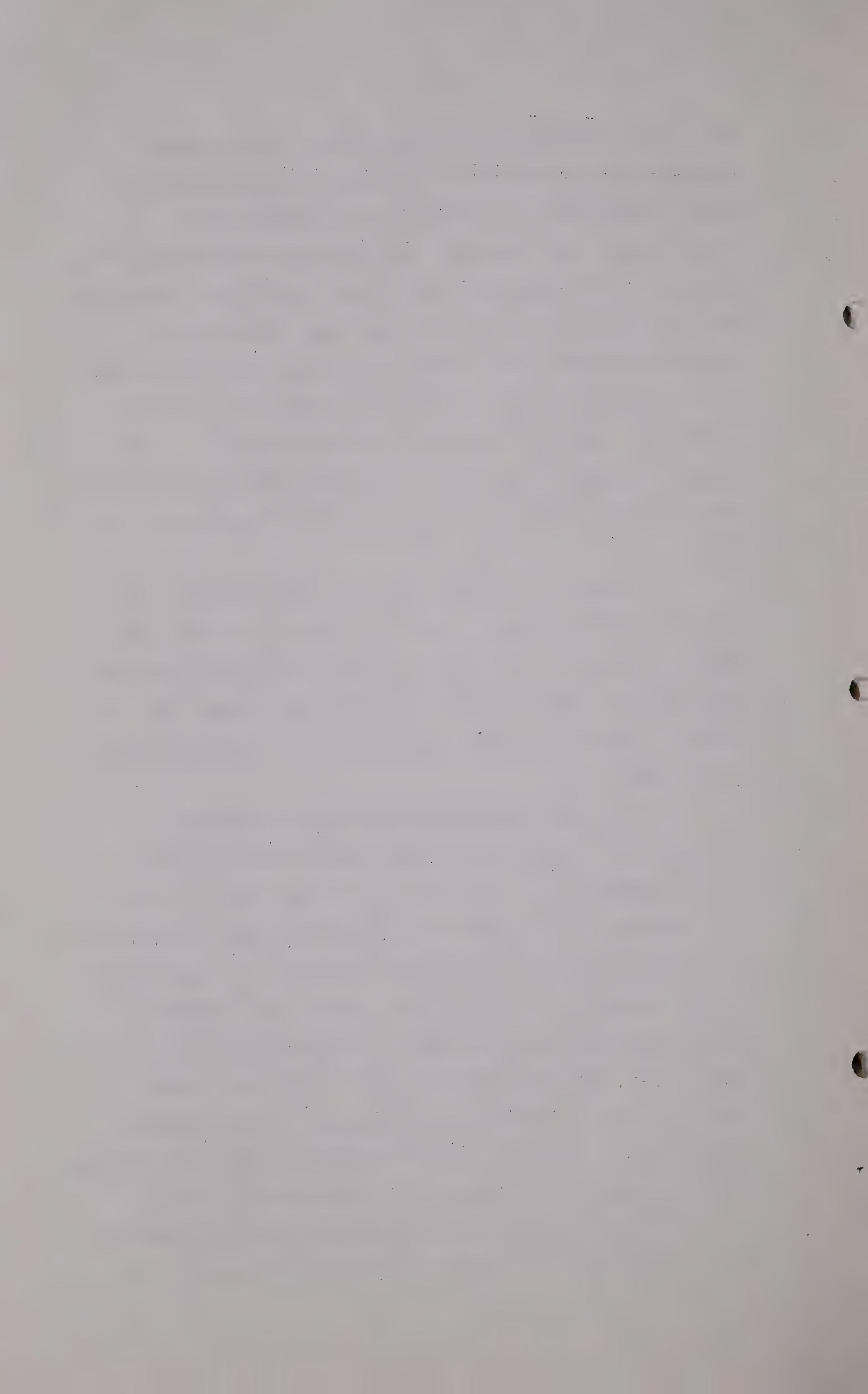


the same time meet world competition. It is equally possible that the owners of the plant, who have received copies of all exhibits filed with the Board and a transcript of the evidence, have made their own calculations respecting the possible price of gas based upon a return to the utility companies of 9 1/2 per cent net per annum, a rate base constructed on the reproduction cost new theory, upon cost allocations on a volumetric basis or, in other words, have made calculations upon bases leading to the largest possible price, and having made these calculations have decided that the plant can continue in operation until 1950.

These conjectures, however, can have no place in the final determination of the price to be paid for gas by Canadian Western at its gate in Turner Valley and the Board must make its computations of market demand based upon the assumption that the plant will continue in operation to the end of 1948.

In 1946, Mr. Brownie again gave evidence. In his previous evidence and on the figures submitted he had given consideration to such factors as the end of the war and the consequent loss of gas load to military installations of all kinds, to less prosperous conditions, to improvement in gas burning appliances and the like. His conclusion at that time was that the trend of market demand would be sharply downwards following the end of the war. He had not taken into account the possibility of rate increases and the effect thereof on market demand, so that the evidence given in 1946 was supplemental to that given in 1945.

He agreed that rates charged by Canadian Western were low compared with rates in the United States but he



argued:-

- (1) That since rates in Southern Alberta have been declining steadily, an increase in price at this time will cause a reduction in consumption to offset the increase.
- (2) That low income bracket users will adjust consumption to fit the new rates rather than to allow fuel needs to encroach upon other budgeted items.
- (3) Other sources of heat will be more closely competitive and in some cases more economical.

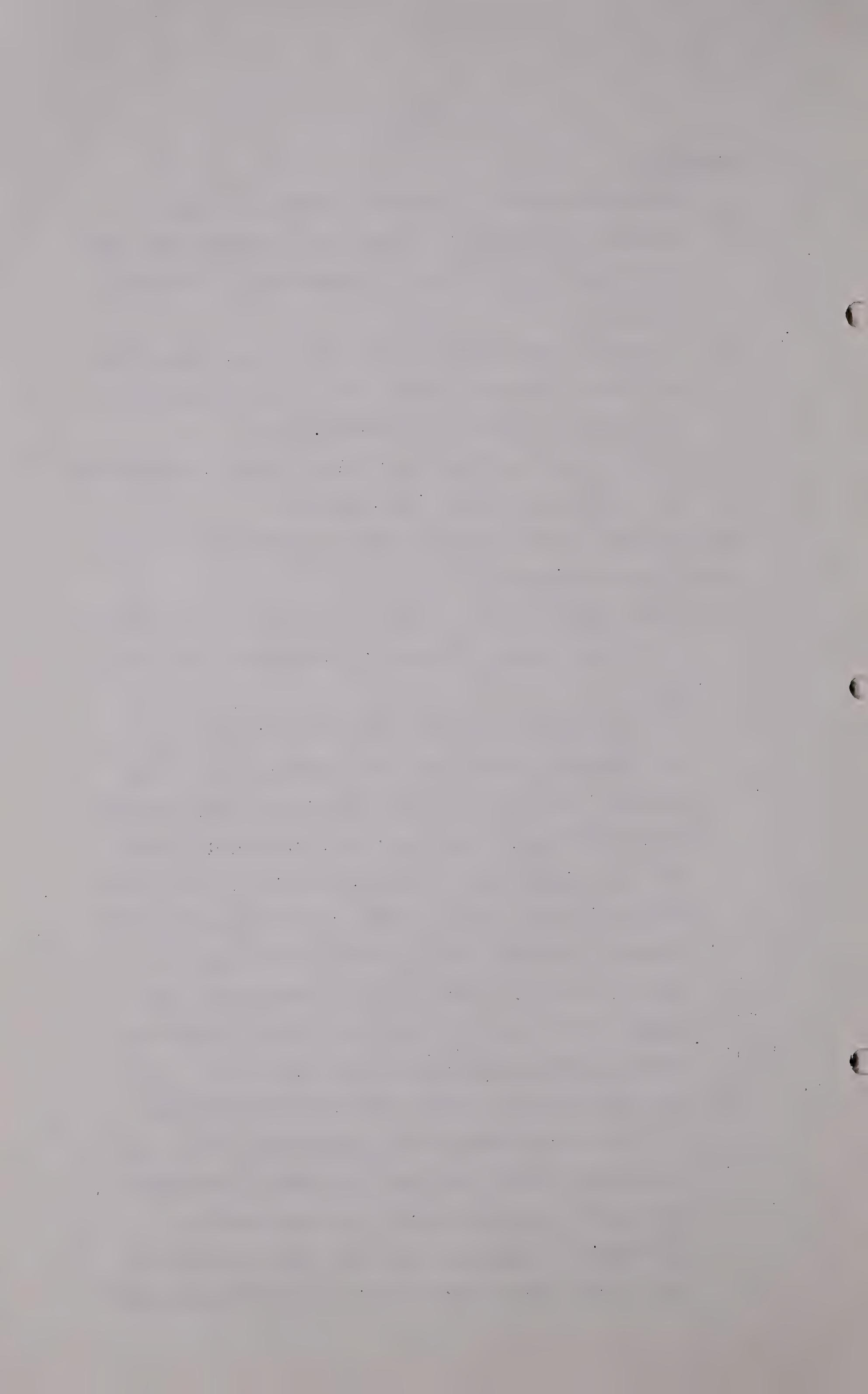
He enumerated certain methods whereby consumption could be controlled and reduced:

- (1) House installation, in which it is said that a saving of 14.5 per cent will result from ceiling insulation alone.

The Board's comment is that insulation is now an integral part of new house construction; that complete insulation of old houses, especially in the case of two-storey houses, is not practical except at heavy capital cost. Ceiling insulation is always simple and the cost is small. In any case, the Board doubts if insulation will be resorted to merely because of any saving in fuel or because of an increase in the price of fuel, but rather because of heating efficiency arising from insulation.

- (2) Early use of storm windows and weather stripping.

The Board doubts if any appreciable saving can be achieved by this method. The change from warm to cold weather in this climate is rapid and the deprivation of fresh air and the indoor discomfort produced by early use of storm windows would rapidly



bring about a discontinuance of the practice - assuming that it was ever instituted.

(3) By more careful control of gas consumption.

The Board considers that early control may happen and may continue for a few weeks but soon will be forgotten.

(4) By a greater use of auxiliary electrical appliances.

In the Board's opinion, the use of these appliances is inevitable, the price of gas notwithstanding, and in any case would not affect the use of gas in this climate for general heating.

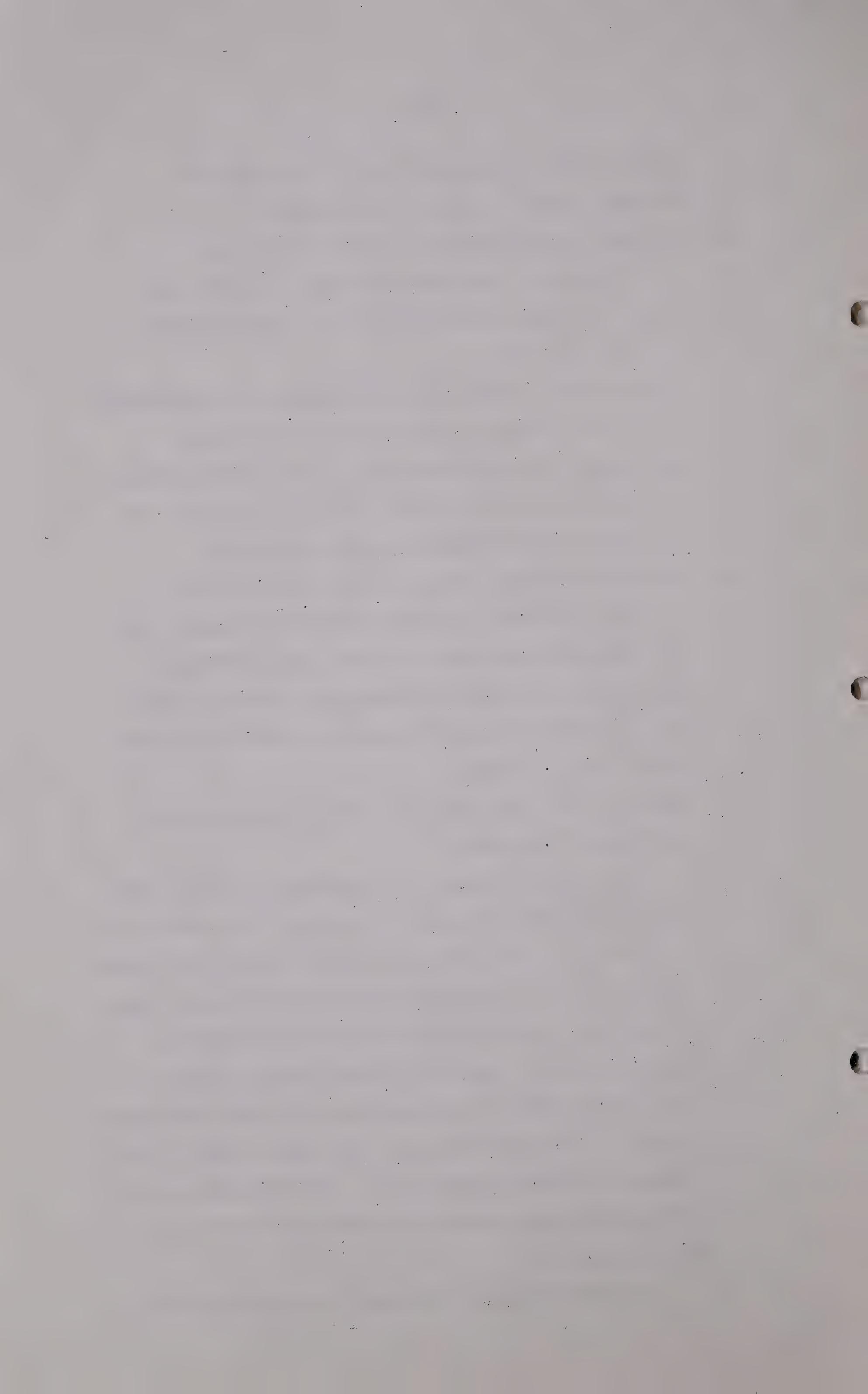
(5) Replacement of gas ranges with electric ranges.

The pertinent comment is that the capital cost of electric ranges restricts the use of them to people in favourable circumstances and that their use is dictated by efficiency and ease of operation rather than by cost.

(6) Replacing gas fuel central heating equipment with coal-fired equipment.

This latter appears to the Board as having some importance, but the danger is slight if the cash cost of gas is less than the cash cost of coal. The words "Cash cost" are used advisedly because from the cash price of gas some allowance must be made for the general utility, the convenience (which includes the absence and need of storage facilities) and the cleanliness of gas over coal, and the availability of coal without reference to its cost. This subject will be further discussed under the heading of "Well-head Price of Gas".

Mr. Brownie also referred to a new appliance



named an anthratube, designed for coal consumption and said to be more efficient than former coal equipment. He did not know the cost of the equipment or the cost of installing it, but it is evidently designed for hot water heating as opposed to hot air furnaces. It could not be used with lignite or semi-bituminous coal and, on the other hand, anthracite or high bituminous coal is neither extensively used nor available in Calgary. Anthracite costs more than Drumheller lignite or semi-bituminous coal and the Board doubts if owners of houses now equipped with hot air furnaces will convert them to hot water heating and install an anthratube merely because the gas may go up a few cents per thousand cubic feet. The positive evidence in this respect is much too nebulous to permit of a reasoned conclusion being drawn.

Another appliance was referred to by the witness, namely, the down-draft coking furnace, but again the evidence does not permit of any reasoned conclusion being reached. Mr. Brownie's evidence, with which it is not proposed to deal in detail, is directed to show that price increases will affect consumption but he would not disagree with the application of statistical information to some of his figures that there was as much justification for the conclusion that consumption remains the same whatever the rate, as there is for the conclusion that total bills remain the same in spite of rate variations.

In 1921, the average domestic rate on the Canadian Western system was 35.02 cents per M.c.f., in 1922 - 44.4 cents; in 1923 - 45.59 cents; in 1924 - 45.82 cents, and in 1925 - 46.11 cents. In that period sales went up to 3,357,000 thousand cubic feet, or putting it another way,



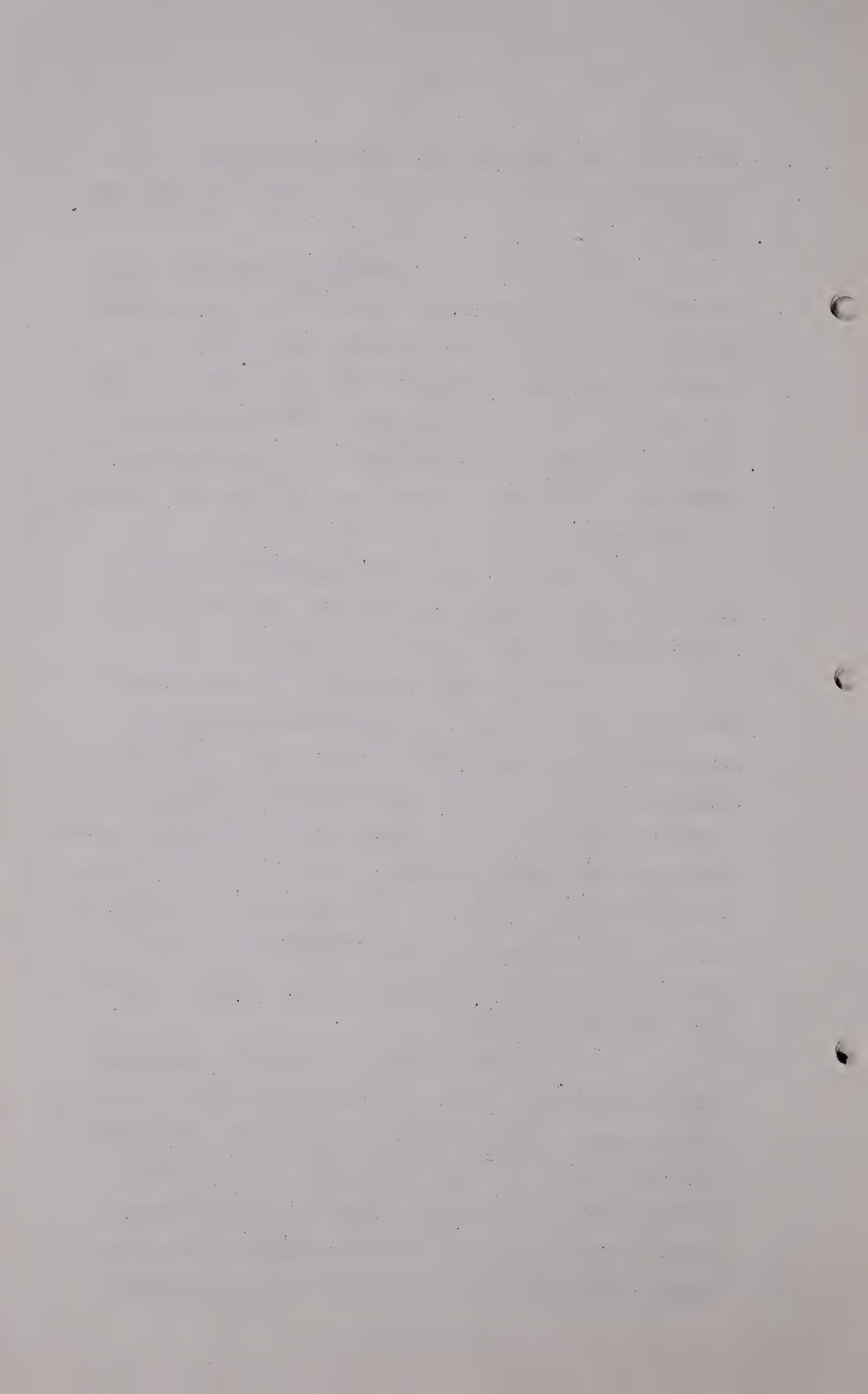
the market was being built up during these years of high prices and at a time when coal was available cheaper than today.

Mr. Brownie was cross-examined respecting the effect of inside insulation. In one of the cases quoted by him the saving in fuel was 46,000 cubic feet or a saving of approximately 85 1/2 cents per month. The cost of insulating a ceiling only would be between \$50.00 and \$70.00, so that it would take from five to seven years to return the investment, without taking into account interest on that investment.

He did not think that a restoration of the two cents deducted from Canadian Western's domestic rate in 1943 would impair the company's revenue.

It has not been proved that an increase in the wholesale price of gas to Canadian Western will automatically result in an increase in the price of gas to the consumers. At the moment, Canadian Western supplies ninety-two per cent of the fuel consumed in Calgary. Again the Board must emphasize that its duty is to fix just and reasonable prices to be paid for gas in Turner Valley. It may be that the fixing of such prices will call for a revision of consumer prices but that must be the subject of a separate inquiry.

There is implicit in Mr. Brownie's evidence the suggestion that an increase in the wholesale price will reduce Canadian Western's revenue because of anticipated decreased sales. Are the revenues of Canadian Western to be weighed against the cost of producing and processing gas in Turner Valley? If gas cannot compete with other fuels then gas will not be used, but that result cannot



deter the Board from carrying out its statutory duty. In any case the Board's experience is that price increases are generally followed by decreased purchases but the recession is psychological and not reasoned and generally is of a temporary character. Perhaps the real problem and one on which the Board has no evidence whatever, and over which it has no jurisdiction, is the extent to which the increase in the Company's revenue through an increase in price would be offset by the loss in revenue through customers reverting to the use of coal.

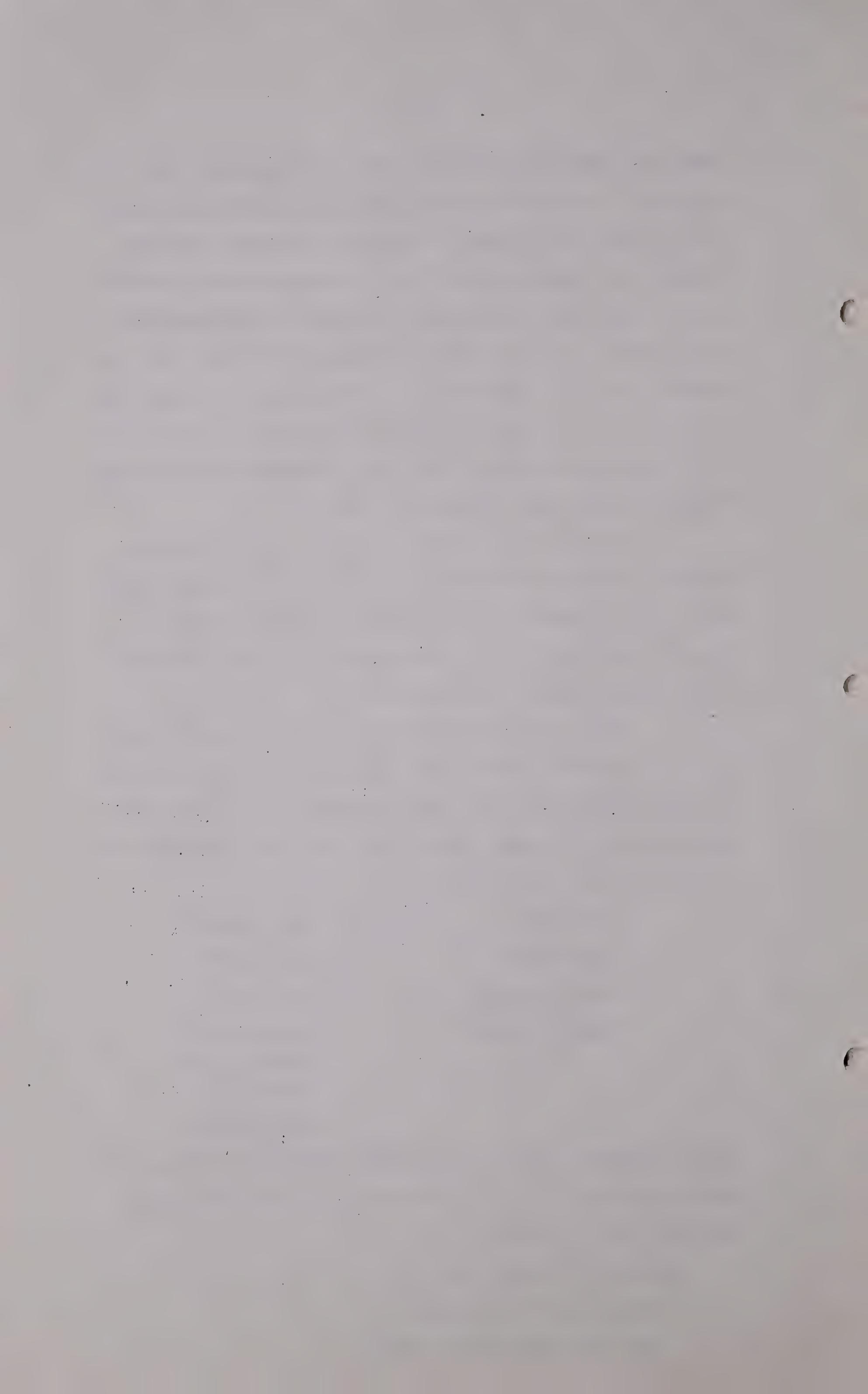
Mr. Brownie did not at this time revise his former estimated demand figures but later revised figures were filed without objection from any party, which, coupled with those of Mr. Stevens-Guille, must form the basis of the Board's calculations.

If the G.O.P. Refinery fuel is eliminated and if it is assumed that the Nitrogen Plant load is lost by the end of 1946, the estimated demand from 1945 to 1948, inclusive, in thousand cubic feet, computed on a basis of 14.4 lbs. and 60° F., is:-

1945 Actual	16,563,927
1946 Actual	15,641,778
1947 Estimated	16,149,800
1948 Estimated	16,142,000
	64,497,505

If the Nitrogen Plant should cease operating at the end of 1946, the demand would be decreased by 6,000,000 M.c.f. The final result therefore is:

Assuming Nitrogen Plant in  
operation till the end of  
1948, the estimated demand



up to 31st December, 1948	64,497,505 M.c.f.
Assuming the Nitrogen Plant ceases operation at end of 1946, the demand up to 31st December, 1948.....	58,497,505 M.c.f.

MARKET SHARING POSITION

Madison and B. A. Utilities each submitted proposals for the equitable sharing of the market for natural gas.

Madison's first proposal was:-

(1) That the right of owners of crude oil wells to participate in the market should depend upon the actual volume of gas delivered to the absorption plant.

(2) That gas cap well-owners should have their market sharing position determined with reference to the amount of gas which they are permitted to withdraw from these wells by order of the Conservation Board.

If gas cap wells produced their full allowables, the combined volume from crude oil wells and gas cap wells could be substantially greater than the market could absorb.

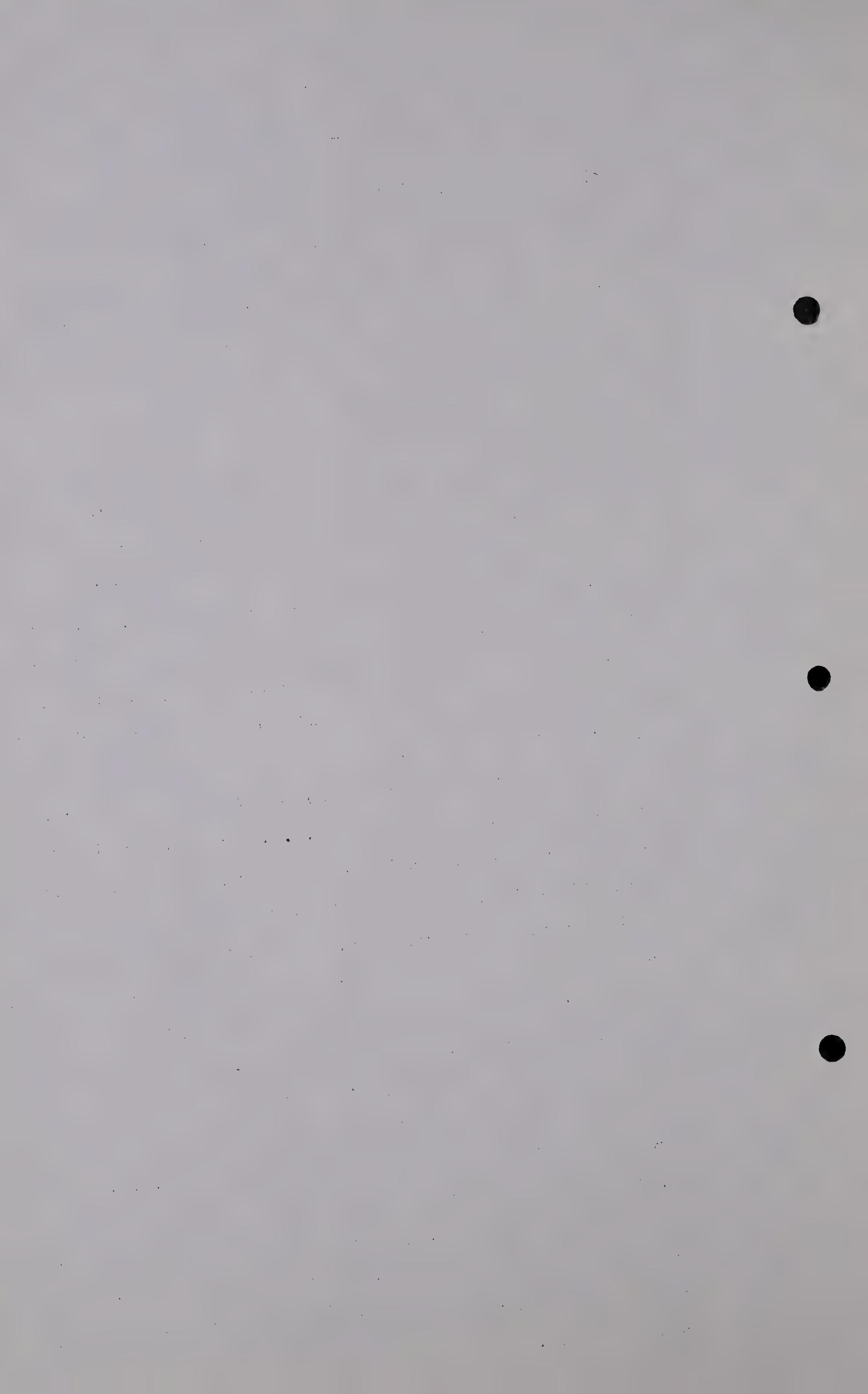
Madison's proposal (agreed to by Royalite) is that Royalite gas cap wells should be produced only to the extent that the market demand exceeds the crude oil well deliveries to the absorption plant plus deliveries from the G.O.R. and B.A. absorption plants. If this system be not adopted, gas would be wasted or additional costly installations of machinery would be required to return excess gas to the formation, resulting in an increase in the price of gas going to market. Since Royalite has the right to produce their gas cap wells to the full extent of their Brown plan



allowables and, since these wells are entitled to a share in the market, some measure of compensation must be allowed. The amount of gas delivered to the market from crude oil wells in excess of their market share represents the amount of gas which Royalite will not produce. Royalite agrees to buy this excess gas from the owners of crude wells and to pay them for their excess gas on a present worth basis, at a well-head price fixed by the Board discounted to the date on which the gas currently displaced will actually be delivered to the market. On the other hand, Royalite will be entitled to receive the current market price for the gas so purchased. Subject to the accuracy of gas reserve estimates and to data respecting the performance of all crude wells, it is considered that the foregoing situation will obtain for a period of ten to thirteen years.

In the summer months, the total gas produced from crude oil wells and from the G.O.R. plant is greater than the market demand. Madison, therefore, has provided installations to return this excess to the limestone formation in the Royalite gas cap area. Royalite has agreed to purchase this stored gas on a present worth basis at the well-head price fixed by the Board discounted to the date on which stored gas will go to the market.

In effect, Madison's proposal resolves itself into a matter of proportion based on actual deliveries from crude oil wells, actual deliveries from G.O.R. and B. A. Utilities plants and on allowable production from Royalite gas cap wells, with due allowance in the latter case made for shrinkage which would have taken place in the absorption and scrubbing plants had the allowables actually been produced.



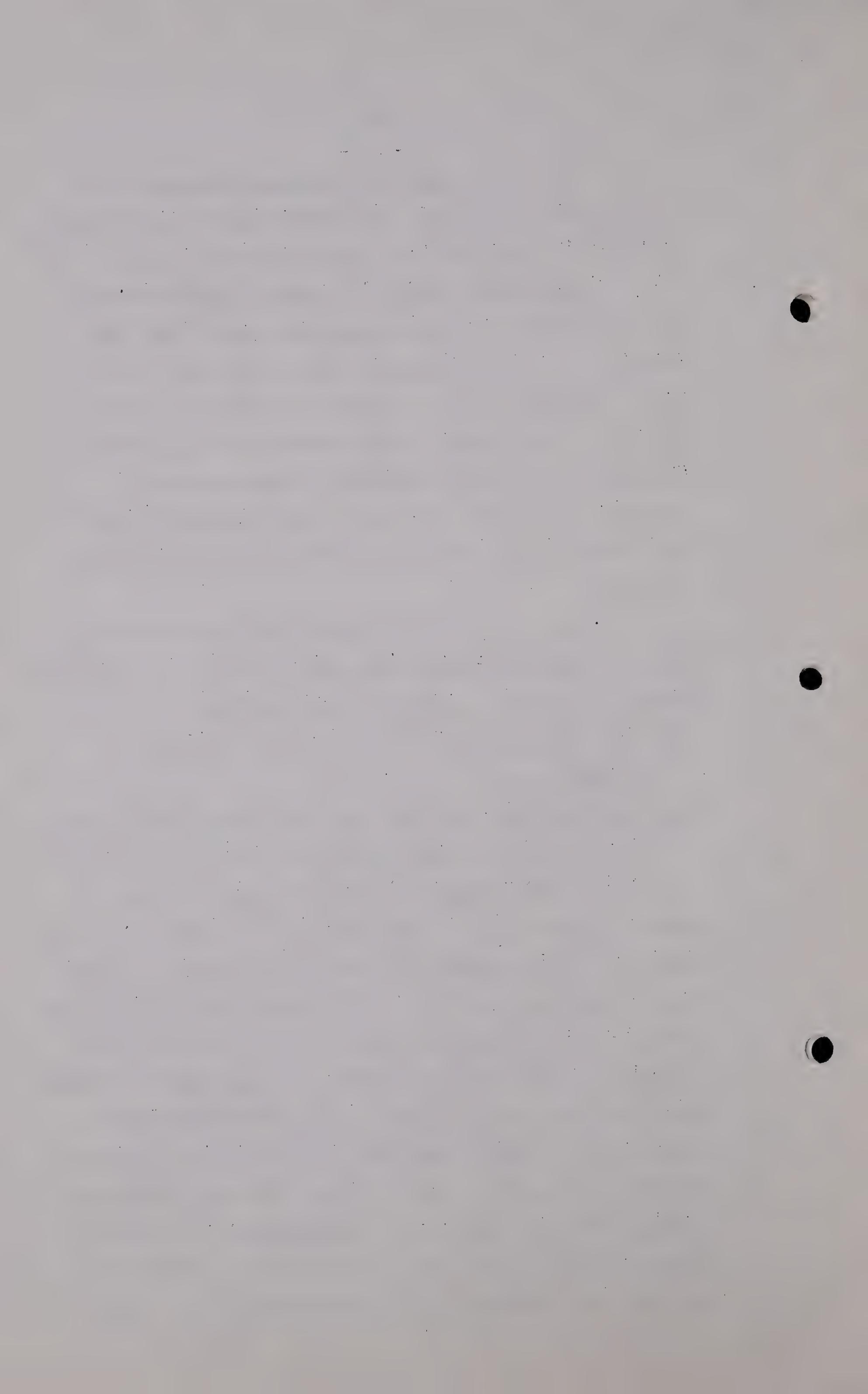
It is not proposed to discuss the accounting procedure to be followed. If difficulties occur or disputes arise, these problems can then be dealt with.

The Board, during the hearing, expressed the view that market sharing arrangements should take into account practical operational difficulties and that as far as possible producers should be allowed to deliver gas over or under their market share when experiencing mechanical difficulties without prejudice to their ultimate position in the market. That suggestion has been adopted by all parties and they are co-operating to that end.

British American's first submission as to the method of computing market position varied in two essential details from that of Madison. They suggest:-

- (1) That all gas wells in the field be treated on a uniform basis.
- (2) That gas flared at the three absorption plants should not be deducted from gas available to the market as long as gas is being conserved or repressured.

Their argument on this latter point is that since producers receive a smaller price for conserved or repressured gas than for gas going to the market, the flared gas should be deducted from the cheaper volume. It is suggested that all flaring could be avoided if sufficient stand-by equipment had been installed but it was also conceded that such installations were not economic or advisable to handle all residue gas from the B.A. Utilities and G.O.R. absorption plants. They pointed out that equipment was available in one area of the field and that wells in that area should not be given advantages not possessed by wells in other



areas. This is tantamount to saying that economic principles should be disregarded and that those wells favourably situate should subsidize wells in a less fortunate position.

Madison filed Exhibit 91, being a formula for market sharing determination, which varied in some detail from their first submission. The submissions made by Madison and by British American were submitted to Dr. Katz, the Board's adviser, and he gave evidence thereon and made his recommendation to the Board respecting the principal differences between the two. These differences were:-

- (1) the treatment of gas repressured in the Bow Island area with respect to the market sharing position;
- (2) the treatment of gas flared at the outlet of absorption plants with respect to the market sharing position; and
- (3) the treatment of gas cap wells in the various areas of the field.

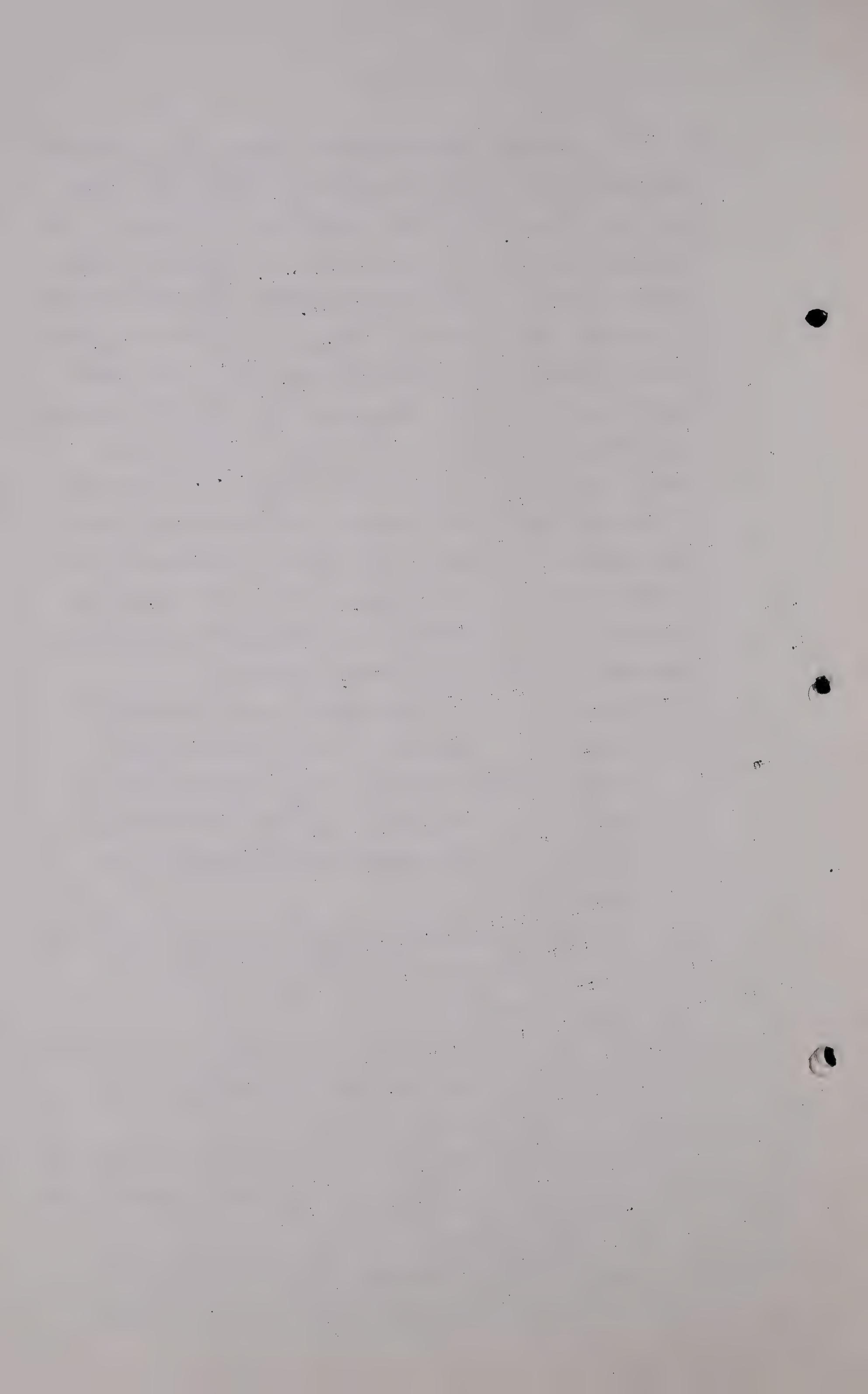
Dr. Katz was of the opinion and so recommended that gas repressured in Bow Island was gas going to the market and should be so considered in computing market sharing position, notwithstanding the price differential. His premises were that the Bow Island repressured gas leaves Turner Valley and may be put to any use that Canadian Western may see fit. In those respects, Bow Island gas is different from gas stored in Turner Valley.

He was of the opinion that flared gas should not share in market sharing computation. Marketable gas is that gas which may be available currently or in the future to the market with the facilities which are installed. Flared gas is simply wasted.



Royalite submits that the market sharing position with respect to gas cap wells should be based upon Brown Plan allowables but that the market sharing position of gas cap wells in the G.O.R. area should be calculated on the amount actually delivered to the market. British American, on the other hand, says that all gas cap wells in all three areas should be dealt with on the same basis. Dr. Katz was of the opinion that since facilities installed were not large enough to handle all gas going from the G.O.R. plant, the market sharing position of the wells connected to the plant should be calculated with relation to actual deliveries to the market rather than to allowables, which, if used, must necessarily be discounted. The Board must, therefore, hold that the market sharing position shall be computed in accordance with the following:

1. The volume of the Conservation Board's allowable of Royalite's gas cap wells for the month less the volume blown to the air in well operation shall be added to the volume of wet gas delivered from crude wells direct to the Madison gas gathering system during the month.
2. The total volume thus obtained shall at the end of the month be converted to residue gas equivalent by deducting therefrom:-
  - (a) the rateable portion thereof used by the Madison system during the month for heater fuel and compressor engine fuel;
  - (b) shrinkage in volume occasioned by the extraction of natural gasoline or other hydrocarbons in the Royalite plant.
  - (c) the rateable portion thereof used during the month for fuel for generation of steam and/or



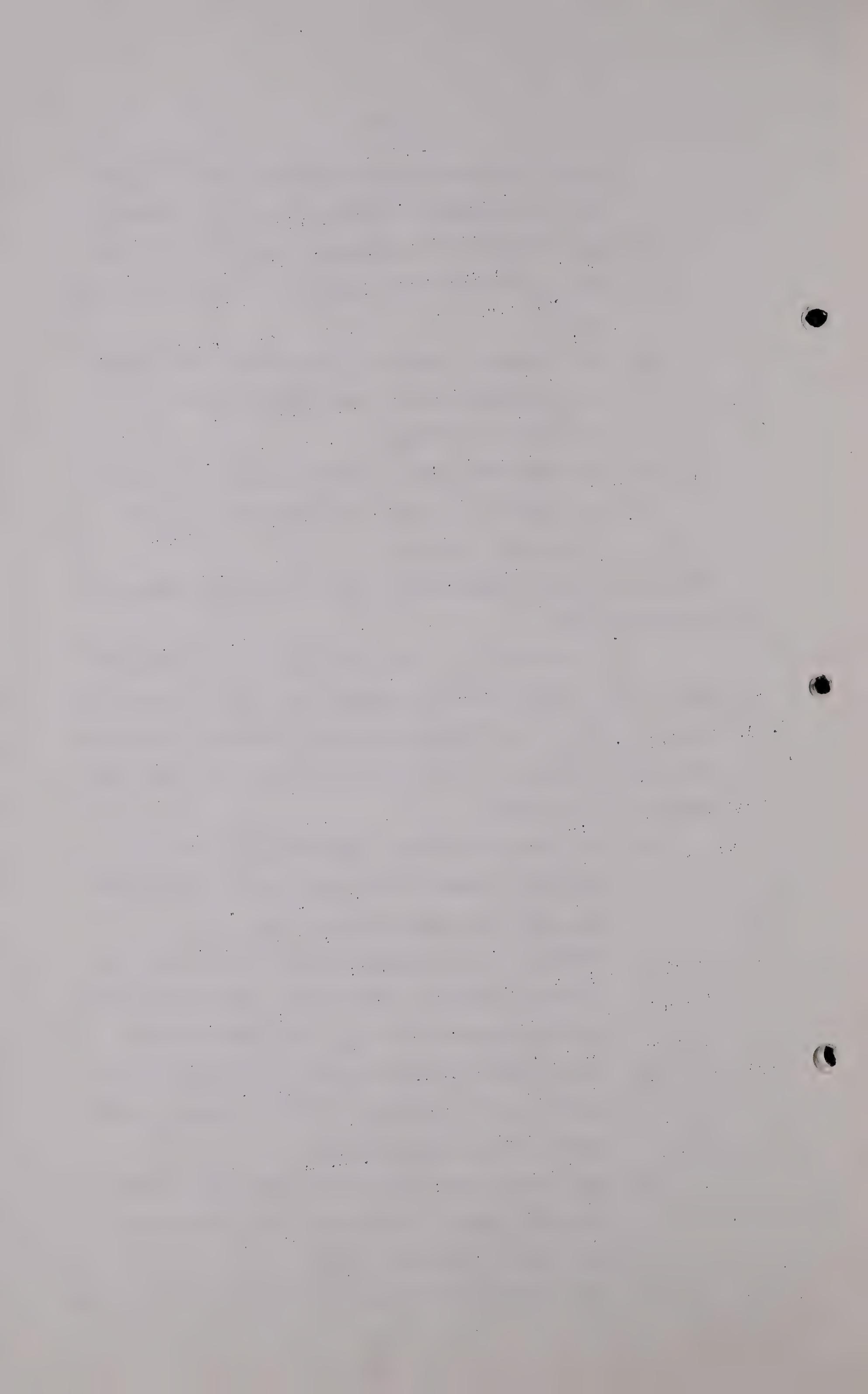
power for Royalite's absorption plant or any use other than for Madison's utility operation;

- (d) any residue gas re-delivered therefrom to the producer during the month for lease or drilling fuel;
- (e) the rateable portion of any residue gas flared or popped to the air from Madison's No. 1 Compressor Station;
- (f) the rateable portion of any natural gas flared or popped to the air from Madison's No. 3 Compressor Station.

The net volume so ascertained shall constitute Madison's marketable gas.

In the case of B. A. Utilities, the volume of wet gas delivered during the month from wells connected to B. A. Utilities' gas gathering system shall at the end of the month be converted to the residue gas equivalent by deducting therefrom:-

- (a) the rateable portion thereof used by B. A. Utilities System during the month, for heater fuel and compressor engine fuel;
- (b) shrinkage in the volume occasioned by the extraction therefrom of natural gasoline or other hydrocarbons in the B. A. Absorption Plant;
- (c) the rateable portion thereof used, during the month, in the operation of the B. A. Absorption plant and auxiliary plants;
- (d) any residue gas re-delivered from the British American plant to producers during the month for lease or drilling fuel;
- (e) any residue gas flared or popped to the air from



the B. A. Utilities' system and from the British American plant.

The net volume so ascertained shall constitute B. A. Utilities' marketable gas.

In the case of G.O.R., the volume of gas delivered by G.O.R. during the month through Madison's meter at the G.O.R. plant shall be converted to residue gas by deducting therefrom:

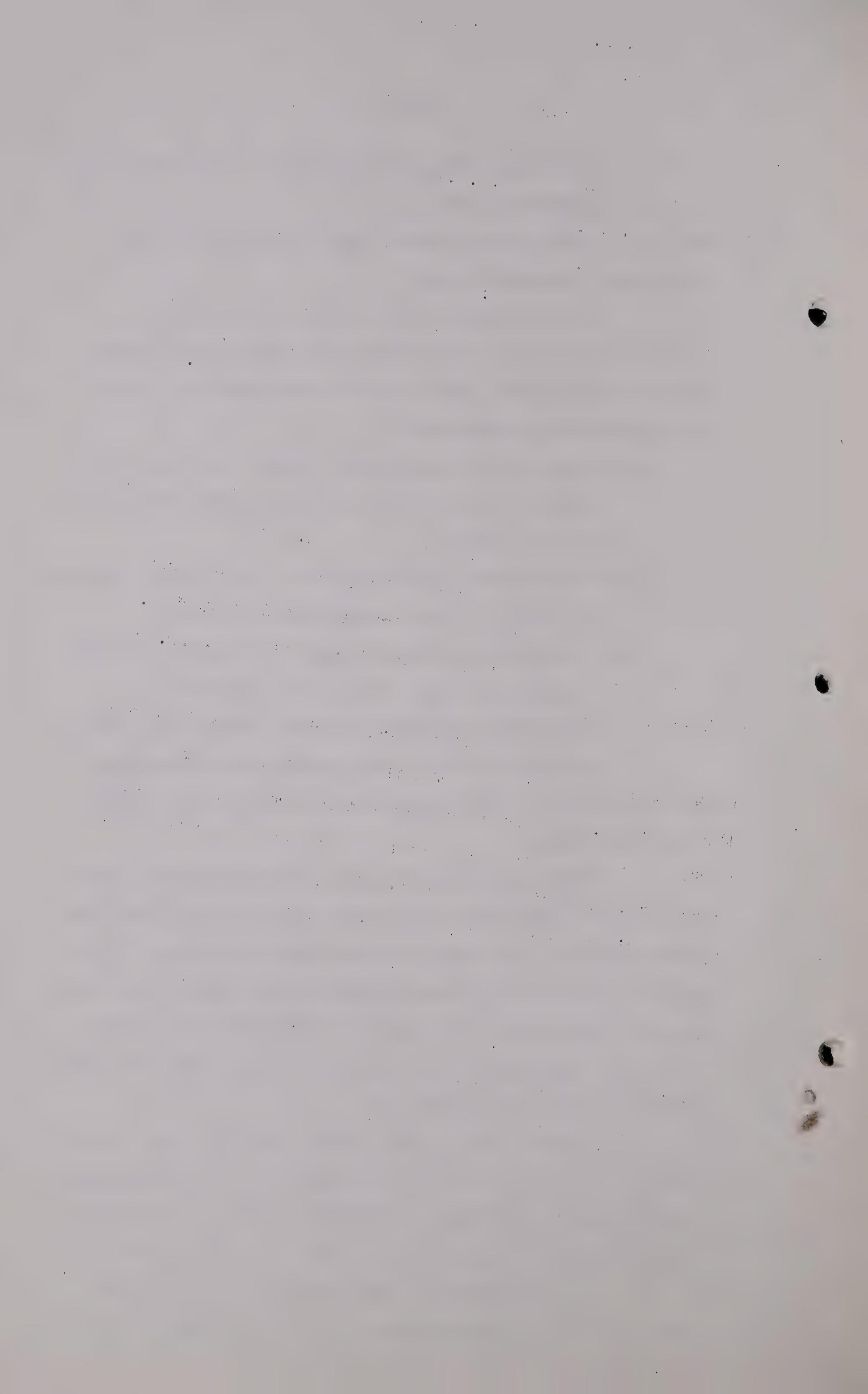
- (a) the portion thereof used during the month for heater fuel in the operation of Madison's South residue lines;
- (b) the rateable portion of fuel used in the operation of Madison's No. 3 Compressor Station;
- (c) the portion thereof flared or popped to the air at Madison's No. 3 Compressor Station;
- (d) the rateable portion of any residue gas flared or popped to the air from the Madison system.

The net volume so ascertained shall constitute G.O.R.'s marketable gas.

The total marketable gas during any month shall be the total aggregate of the three net volumes from the three plants. The share of these three companies in the market for any month shall be that proportion of the total market requirements for such month which the respective companies' marketable gas for that month bears to the total marketable gas for that month.

These formulae may require revision from time to time as conditions change and it may be that the practical working out of this market sharing position will suggest needed changes and can be dealt with when they arise.

The market to be shared shall consist of all customers who purchase scrubbed gas, including gas sold



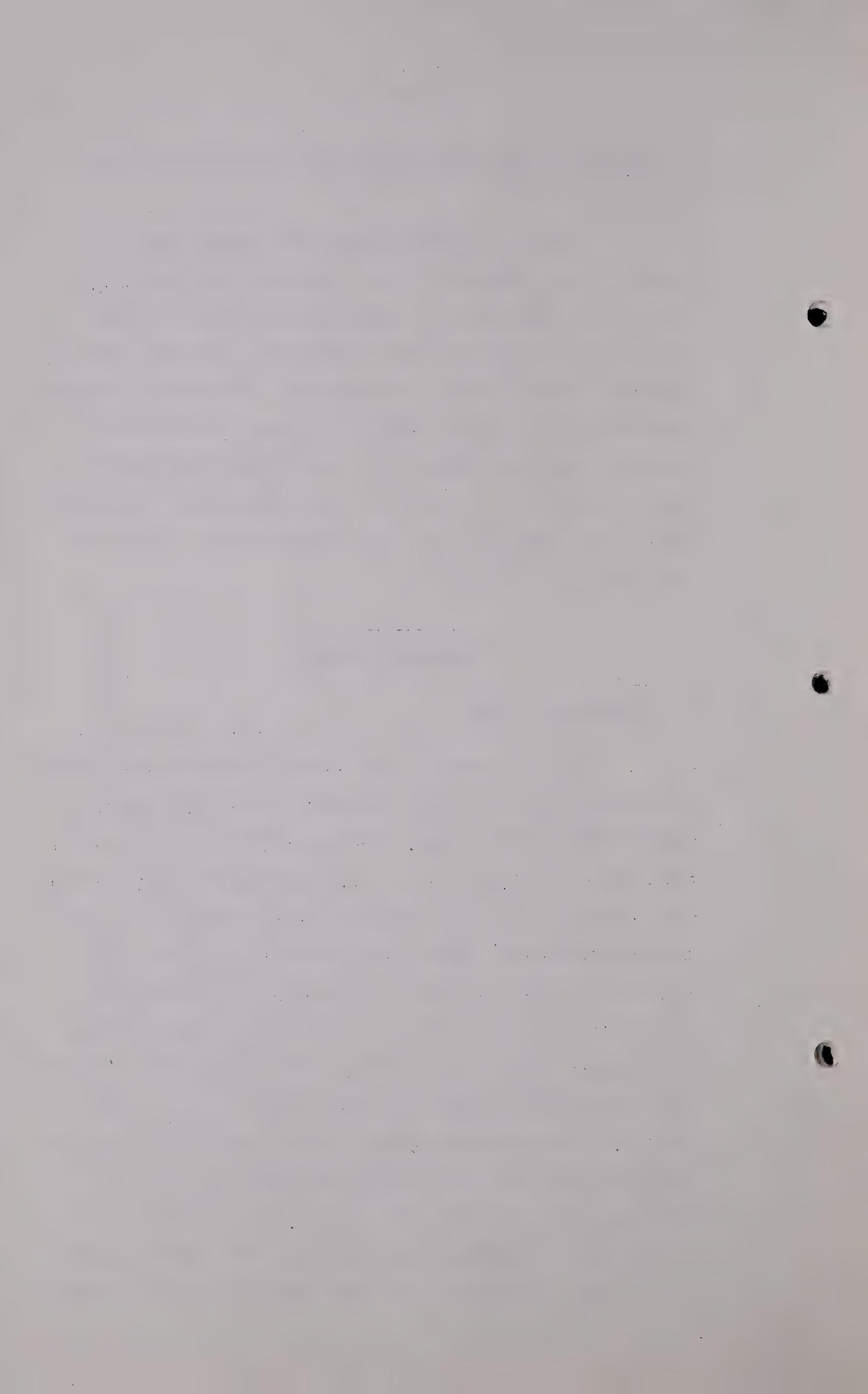
to Canadian Western and stored by it in the Bow Island field.

It was intimated during the hearing that producers in the south end of the field were attempting to work out a unitization scheme applicable to that area, and in fact a draft proposal was filed, but up to date no concluded agreement has been reached. The Board, however, assumes that any scheme adopted by these producers to regulate their own affairs will not affect the market sharing position, or the basic well-head price, and apart from formal approval - if approval be needed - need not be considered at this time.

#### REPRESSURED GAS

##### 1. The Madison Area:

A difficult question arises relating to the cost of gathering gas produced from crude wells in excess of market demand and the cost of pumping that gas back into the underground formation. Should these costs be borne by the producer or by the consumer? The excess gas is legally produced under the Brown plan pursuant to orders of the Conservation Board as an incident to oil recovery and it could be said, and indeed was vigorously argued on behalf of the City and Canadian Western that the incidence of the costs of gathering and repressuring surplus gas should be upon the oil operators who may be said to have created the problem. Prior to the enactment of The Natural Gas Utilities Act, gas from the majority of crude wells was flared and consequently had no value. The orders issued by the Board pursuant to the Statute have created a market

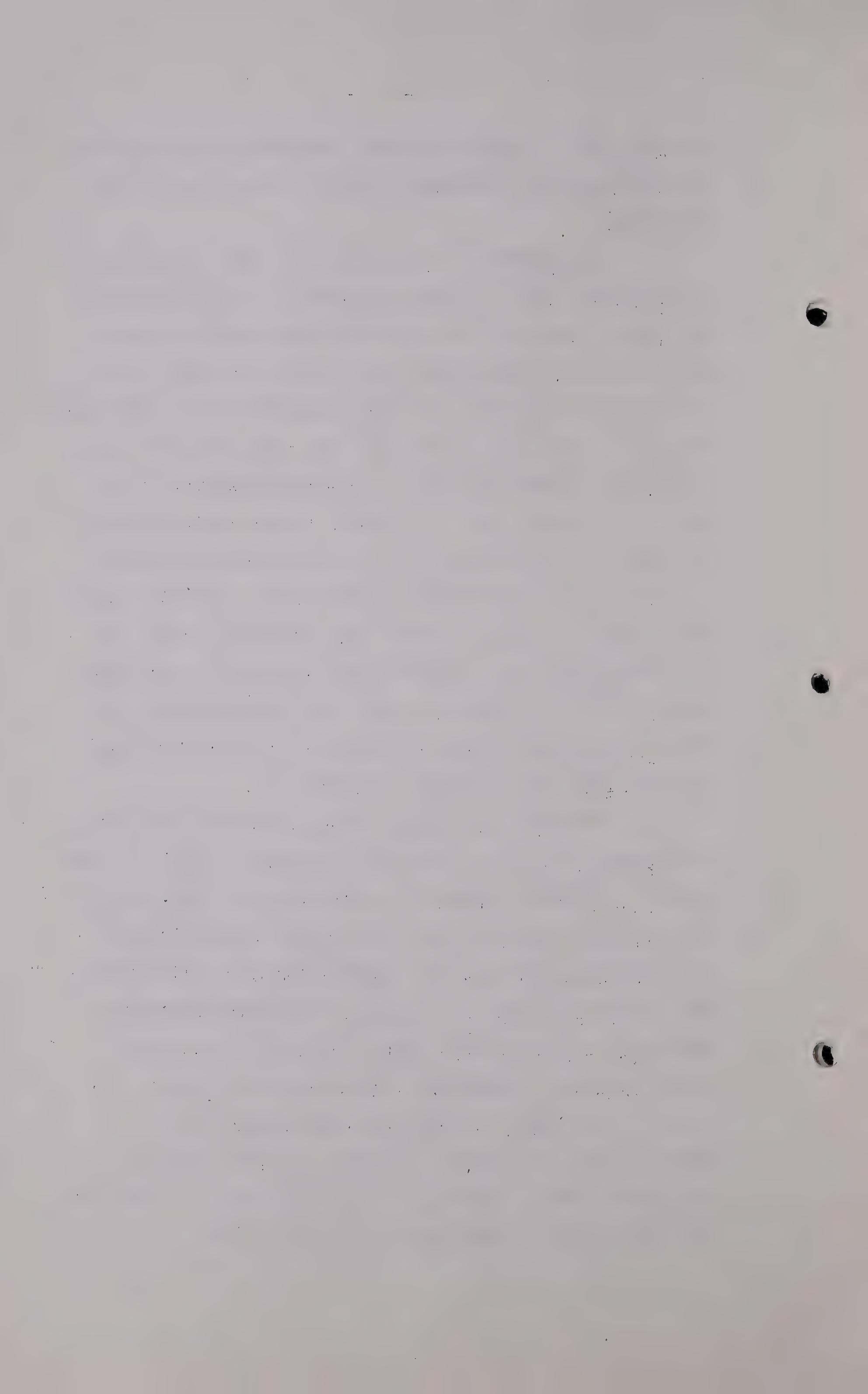


for what was a waste product and the Statute has provided for repressuring of excess gas in the interests of conservation.

It, however, can also be said that by repressuring this gas, fuel has been conserved for the benefit of the market and that those who enjoy the benefits should bear the cost. The problem is somewhat different in the two areas of the field. It was argued that the repressured gas might never be recovered and that the consumer of gas should not be asked to pay for the conservation of fuel which he may never use. Dr. Katz, in advising the Board, felt that the cost of gathering and repressuring should form part of the operating expenses of the utility company furnishing gas to the market. His principal reason was that equipment which provided gas for peak loads is used in off periods to put excess gas back in the ground. He also foresaw difficulties in computing cost and writing off that cost over a period of years.

It would be illogical to say that the gas should be conserved and at the same time say that it has no value because its worth is spent in conserving it. Equally is it illogical to produce gas from a well which furnishes gas alone or which produces naphtha, gasoline and natural gas, or one or other of these products and to say that such gas has a value but that if crude oil is produced under the power of gas-lift, the gas has no value.

Dr. Katz' evidence and his recommendation in effect is that the market, that is, the consumer must pay the current cost of gathering and recompressing excess gas, and that evidence commends itself to the Board.



The Board is directed by Statute to fix a just and reasonable price to be paid for gas at the well-head. If the cost of gathering and compressing gas not immediately required for the market is equal to or greater than the well-head price, then there is no well-head price for that gas. The excess gas, if repressured, is stored in the gas cap area. Is it proper to say that when the original gas cap reserves are exhausted that the repressured gas has a value equal only to the cost of storing it for a number of years? The Board does not think so. The Board has power to compel owners and operators to return gas to the underground formation and in addition has power to fix a just and reasonable price to be paid for such gas, and these powers clearly indicate a price differential.

It can be said and was so argued that the repressured gas price should be the well-head price, less the cost of repressuring, but the Board cannot accept that view. If that was the intention of the Legislature it surely would have said so in plain unmistakeable terms.

The statutory directions to the Board briefly are:-

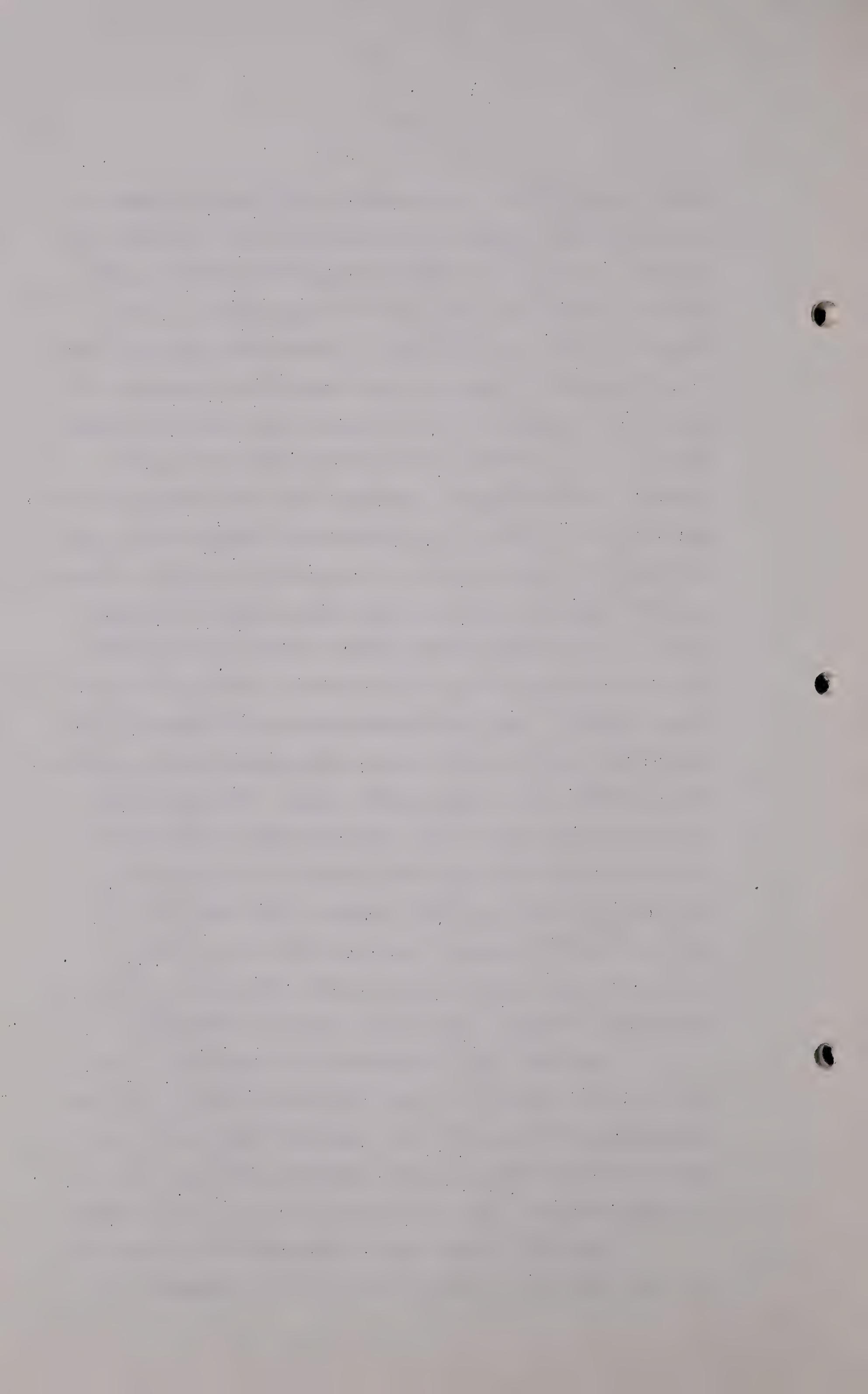
1. To fix a well-head price.
2. To fix a price for gas after it has been treated in an absorption plant.
3. To fix a price for gas after it has been purified including a price to be paid for the purified product by the retail public utility company.
4. To fix a price for repressured gas.



These directions are interpreted by the Board to mean that the price to the retail company must be the well-head price plus the proportionate cost of transportation to the absorption plant, plus the cost of transportation to the scrubbing plant, plus the cost of purification and the cost of repressuring. Excess gas not immediately required for market is repressured after it leaves the absorption plant and does not go through the scrubber until it is again produced for the market. The Board can find nothing in the Statute which suggests that the cost of repressuring is to be charged to the producer of that gas but, on the contrary, is of the opinion that on a true construction of Section 27, the cost of repressuring must be borne by the public utility operator and must be reflected in the cost to the retail company. Any other construction could lead to confiscation if the cost of repressuring should equal or exceed the well-head price fixed by the Board. If repressuring costs are to be paid by the producer, then if these costs are greater than the well-head price, the producer when delivering his gas would be obliged at the same time to pay any cost in excess of the well-head price. Such a construction is repugnant and, in the absence of a clear unambiguous statutory direction, cannot be accepted.

The fact that repressuring is required is being treated by the Board as a factor in determining a just and reasonable well-head price and once that well-head price has been fixed, all subsequent costs must be added to it in determining the price to be paid by retail distributors.

Royalite, which owns or controls the gas cap in the north end of the field, is willing to undertake the



repressuring of excess gas through certain of its wells and it will market that gas at some subsequent date. It will purchase the gas at the discounted well-head price. It is further suggested that the price for residue gas once fixed should remain constant so that when the re-pressured gas is withdrawn, Royalite will receive the price paid by it for that gas plus interest thereon for the storage period.

The question of royalties payable to the Provincial Government and to the holder of over-riding royalties was raised but these are matters over which the Board has no jurisdiction and must be dealt with under existing or other government regulations or by agreement between the parties producing and handling gas and those entitled to receive royalties therefrom.

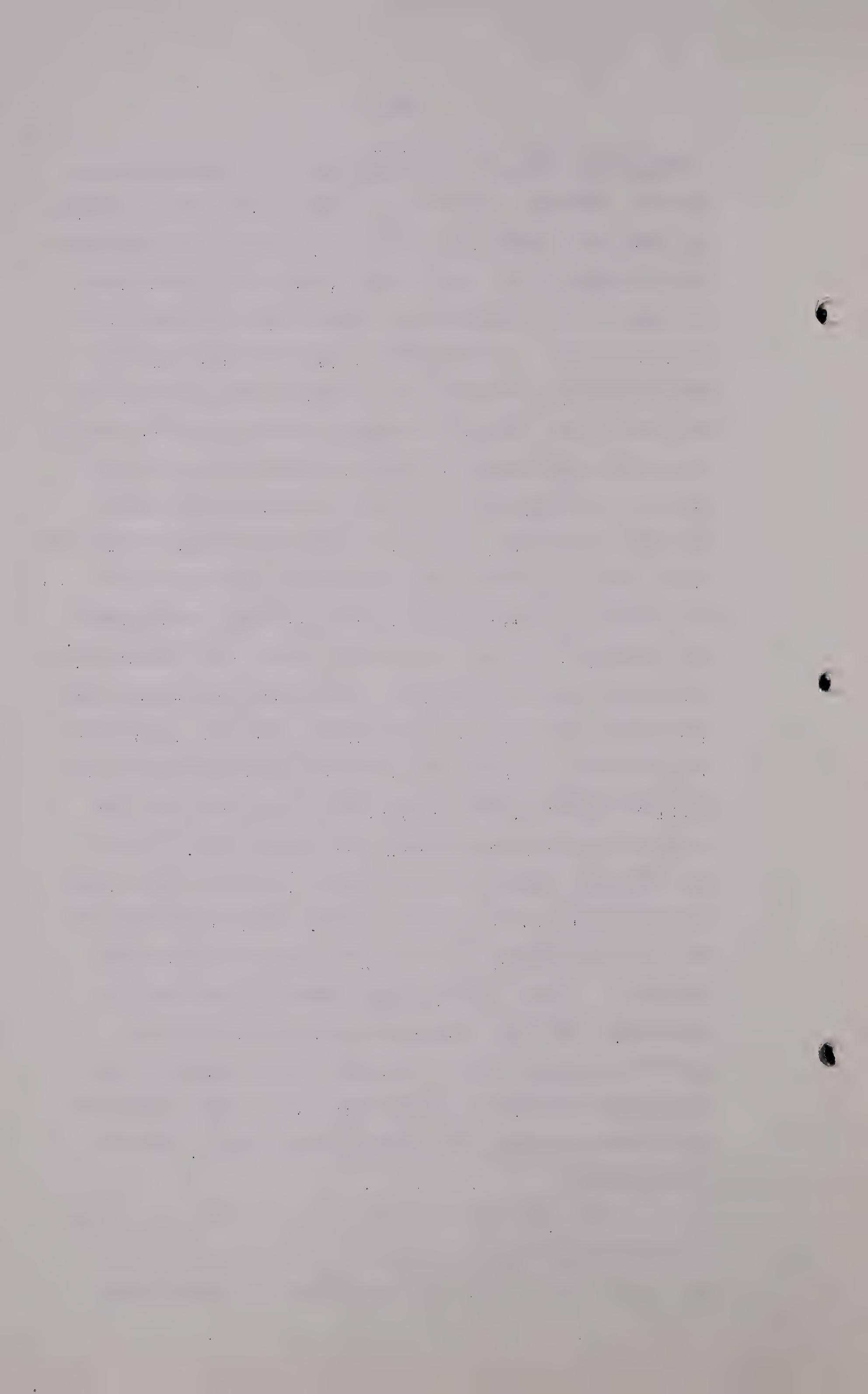
It was argued that by charging repressuring costs to Madison, the present day customer would be paying these costs and the customer fifteen years hence would get the benefit. The reply to that suggestion is that the payment of these costs assures the conservation of that which otherwise would be lost and provides a supply of gas when the original reserves in place are exhausted.

Mr. R. E. Davis expressed the view that consumers should be charged a proper fair share of the cost of storing gas, if they are assured that gas will be available to them at a future date. In this case, the evidence is that the Royalite gas cap is a tight formation from which there is little, if any, migration and it is as certain as anything can be certain in commercial life that the stored gas will be available for the market at the end of the discount period. It matters not if the individual customers or some



of them have changed in the meantime. A merchant places goods in storage. The cost of these goods, transportation and handling charges and storage charges will be reflected in the price to the customer and it does not concern the merchant if the customer be a regular one or a new one or an isolated one. He may make an error in his estimated storage charges resulting in greater or less profits than he anticipated. Some of the goods may be spoiled or otherwise become unsaleable but these factors only go to the question of profit and loss and do not affect the fundamental principle. Mr. Davis stated that those who benefit should pay for putting the gas into the reservoir but he was doubtful as to who would be the ultimate beneficiary. That evidence is of no help to the Board. The repressuring costs must be met by Madison. Is the Board to say to that company you must pay the cost now and wait for repayment until the gas is reproduced, at which time the Board will add these costs to the persons who use the gas? Is the Board to discount the amount of gas stored and, if so, what discount factor should be used? When the time comes to charge these costs, should they be charged against the whole volume originally stored or against the discounted quantity? If the Board directs Madison to pay the repressuring costs now without allowing these costs as operating expense, then it is quite clear that the Board would permit Madison to capitalize these costs, permit the amortization thereof and most certainly allow a rate of return thereon.

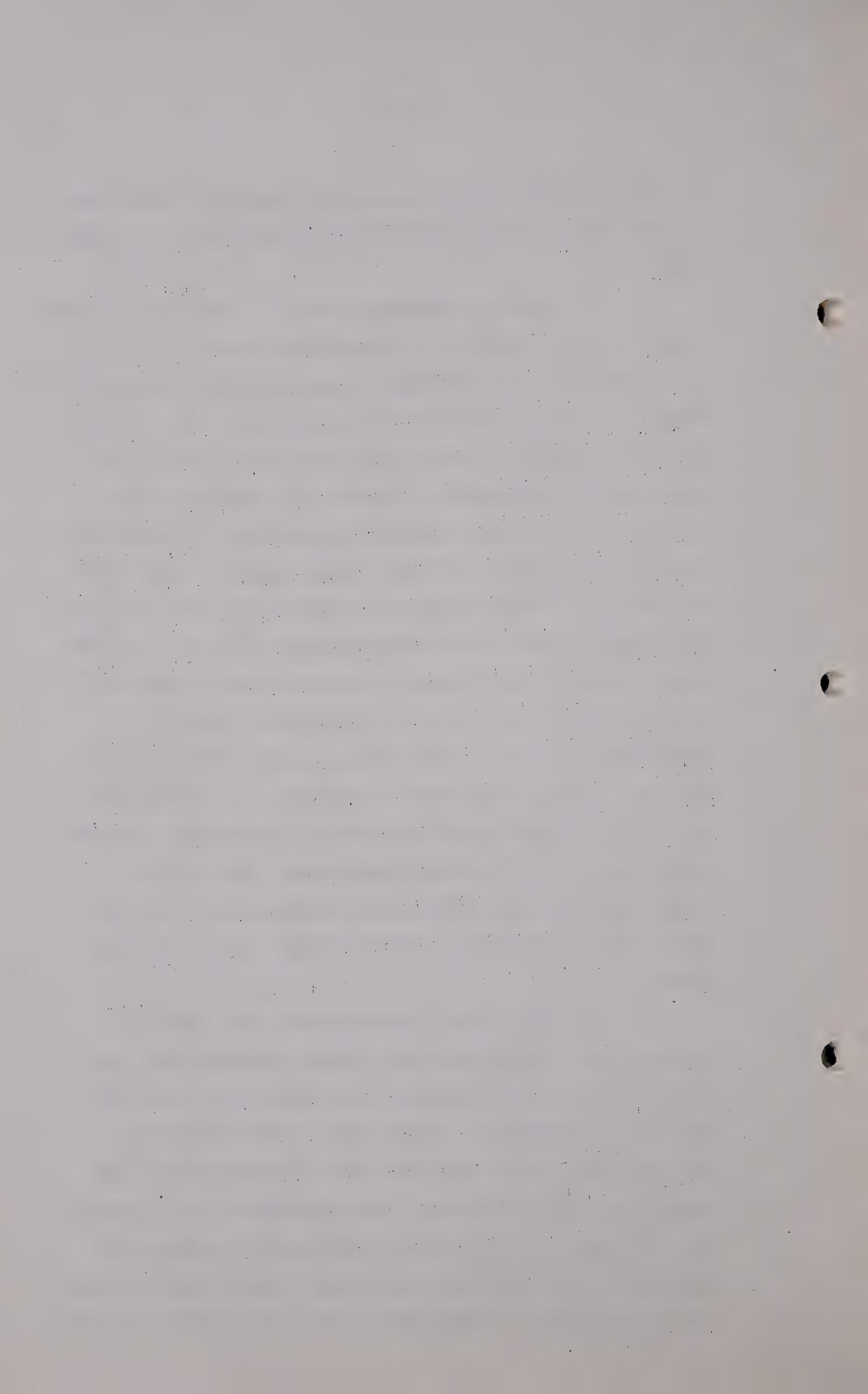
The point was illustrated by Mr. Brownie (called by Canadian Western) in which he agreed that if a person were using coal, he has to supply storage accommodation,



whereas if he uses gas, the company furnishes the storage. In both cases, the user of the commodity pays the storage cost.

Mr. Zinder, called on behalf of Producers, agreed that it was not unusual for present day users of utility gas service to pay something through the rates presently charged to provide for future supplies. If it be assumed that we are dealing with a gas field purely and simply without the complication of crude oil, naphtha, natural gasoline, low and high pressure systems and a repressuring problem, then if the utility company acquired leaseholds to provide for future supplies, drilled stand-by wells and connected them to the gathering system, it would be quite proper to allow the company to charge lease rentals to operation and to add the cost of stand-by wells and gathering lines to its rate base. As the Board sees it, the two situations are quite comparable. In other words, the cost of gathering and compressing excess gas (ordered under the direction of the Legislature) is a fair and proper expense which the utility company must bear and which must be reflected in the ultimate cost to the consumer.

It must not be overlooked that the crude oil operator can only produce his maximum allowable as fixed by the Petroleum and Natural Gas Conservation Board and that he is entitled by law to produce that allowable. Then the Legislature says that gas not required for the market must be repressured. The alternative is to limit the production of oil to the extent that the amount of gas required to lift oil will be that amount required for the retail market. That alternative, over which the Board



has no jurisdiction, cannot be considered.

If in future years repressured gas becomes more valuable, through additional utilization, it may be that some adjustment will be required in this situation but the Board cannot indulge in hypothetical assumptions but must deal with the facts as they exist today.

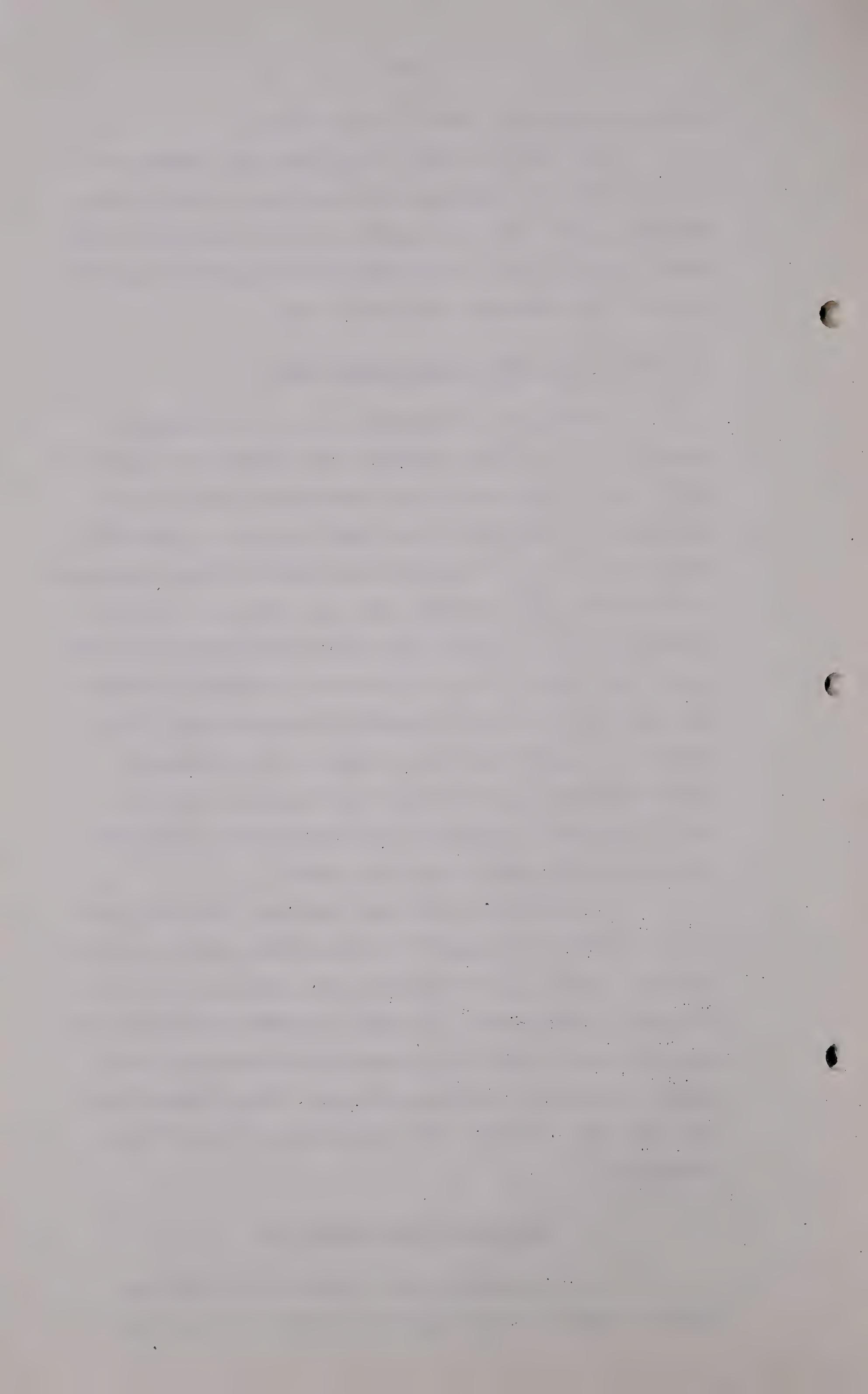
2. The British American Utilities Area:

Before the installation of its low pressure system, B. A. Utilities gathered gas produced at a pressure which made it available to the absorption plant without compression. The Company has now installed a gathering system to pick up low pressure gas which is then compressed to absorption plant pressure and use. The low pressure installation has increased the life of the absorption plant by at least nine to ten years and has furnished a natural gasoline and a natural gas market to low pressure well-owners. B. A. Utilities only delivers to the Madison scrubber the volume determined by its market sharing position and the balance must be repressured in the area surrounding the British American plant.

On account of the cost involved, the difference in the benefits accruing to the absorption plant and to the producers in the B. A. Utilities Area compared with conditions in other areas, the Board considers that different principles must apply from those already discussed with respect to Madison's repressured gas. These matters, however, can best be dealt with under the heading of "Cost Allocation".

BOW ISLAND REPRESSURED GAS

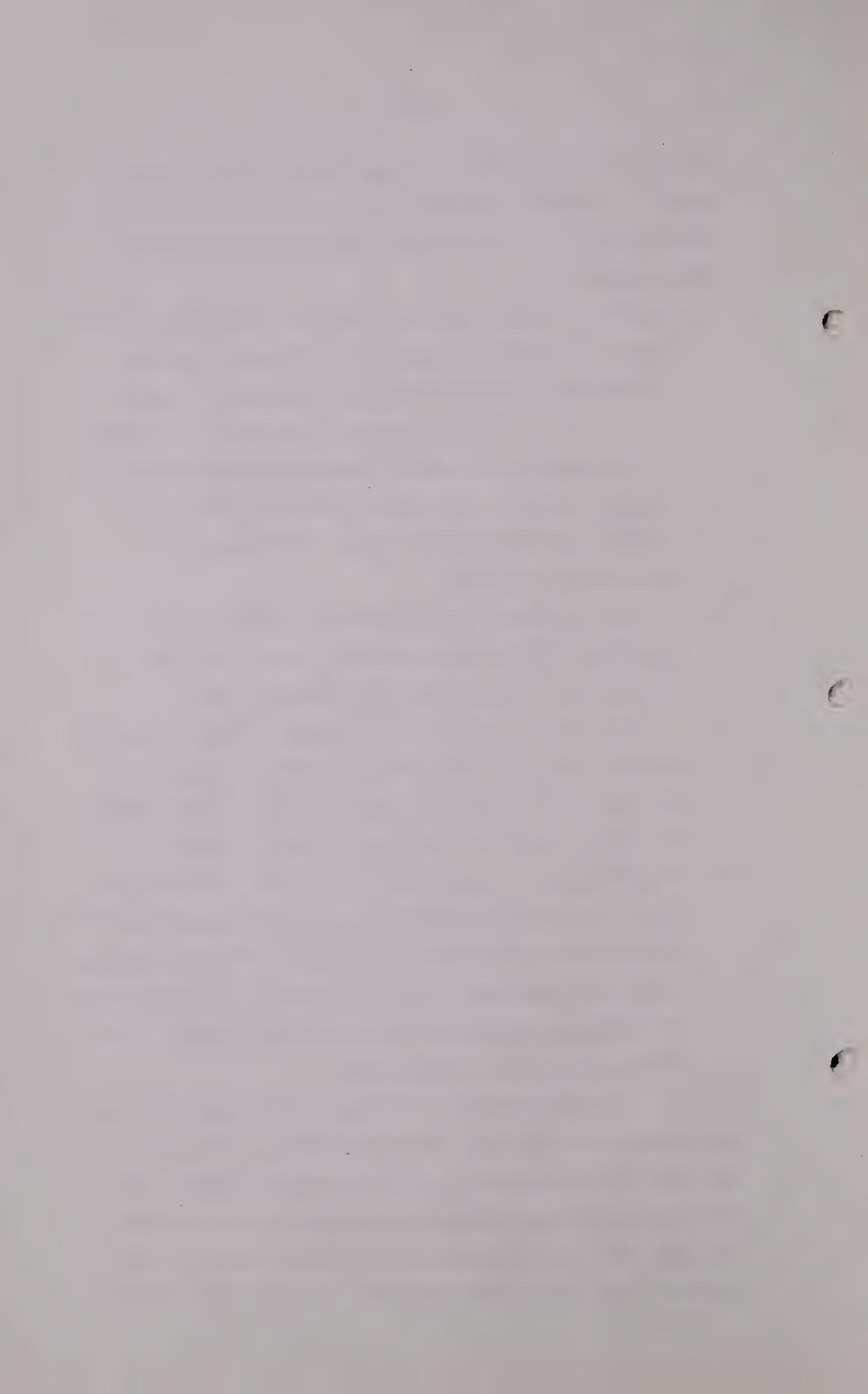
On 20th August, 1930, Royalite and Canadian Western entered into an agreement whereby they arranged



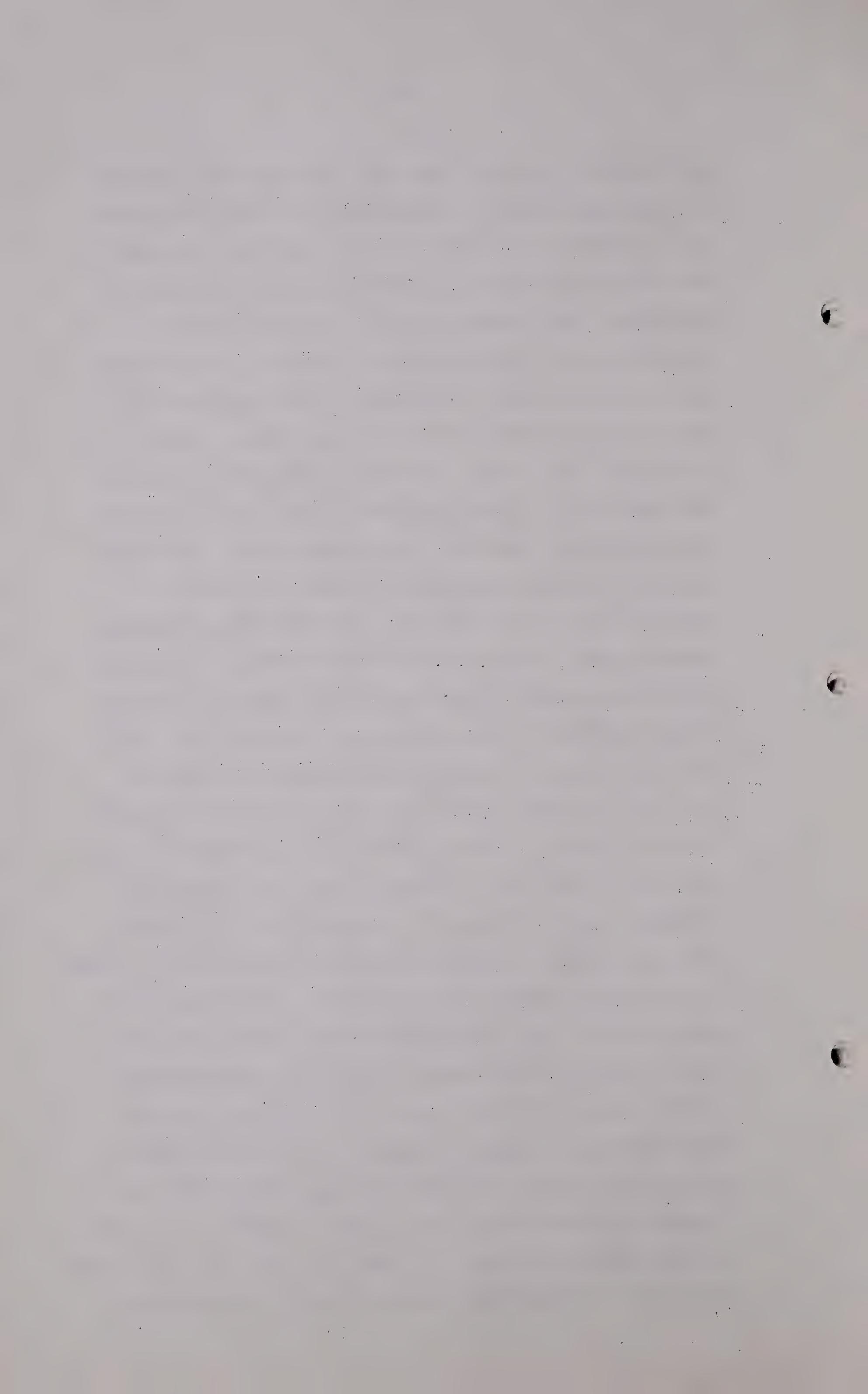
for the storage in the Bow Island Field (owned or controlled by Canadian Western) of a portion of the excess gas produced in Turner Valley. The essential terms of the agreement were:

- (1) Canadian Western agreed to erect in Bow Island a compressor station capable of injecting into the underground formation 3,000,000 cubic feet of gas daily, and if the recharging of the field was found to be feasible, to erect further compressor units.
- (2) Royalite agreed to deliver to Canadian Western excess gas from Turner Valley - the gas to be scrubbed if necessary.
- (3) No charges to be made by Royalite for the gas delivered and no charges to be made by Canadian Western for transporting, compressing, etc.
- (4) The gas repressured is the property of both companies in equal shares. The gas delivered is metered but an allowance is made for engine fuel, and an allowance of ten per cent for storage and other losses.
- (5) Royalite is to be paid for its share of the gas withdrawn an amount per thousand cubic feet equivalent to twenty-five per cent of the average price per thousand cubic feet received for gas by Canadian Western during the preceding six months with a minimum price of four cents per thousand cubic feet.

In its submission, Royalite first suggested that the price to be paid for gas repressured in Bow Island be the same price as is paid in Turner Valley, namely, the well-head price discounted for a period of fifteen years at eight per cent per annum. This would pass on to the consumer the cost of the operation. In that connection it



may be pointed out that the cost of repressuring gas in the Bow Island field is capitalized by Canadian Western and is added to its rate base. It is to be noted that but for the repressuring equipment already installed at Bow Island, additional equipment (with consequent additional cost) would have been required for repressuring in Turner Valley. Royalite's first submission was that it would continue to be bound by the agreement referred to only if the cost to Royalite was not greater than the cost of purchasing gas at the repressured price in Turner Valley but with the maximum of 3.6 cents when compounded annually at eight per cent per annum or a maximum of one cent per M.c.f. Subsequently, however, Royalite gave notice that it would no longer be bound by the 1930 Agreement. The situation has now been changed by the enactment of The Natural Gas Utilities Act. Up until the passage of that Statute, excess gas going to Bow Island was Royalite's property and it could do with it as it pleased. Excess gas today is gathered from many wells which were not formerly connected to the Madison gathering system and Royalite no doubt has the right to say that because of changed conditions it no longer wishes to be bound to perform its agreement. There is no suggestion on the part of Canadian Western that it has the right or that it will attempt to enforce that agreement and the Board is of the opinion that it has no power to make any order in respect thereof. If Canadian Western desired gas for the purpose of repressuring in the Bow Island field and was willing to pay a specific price for it, the Board would have power to order delivery of the gas if it considered the offered price to be adequate.



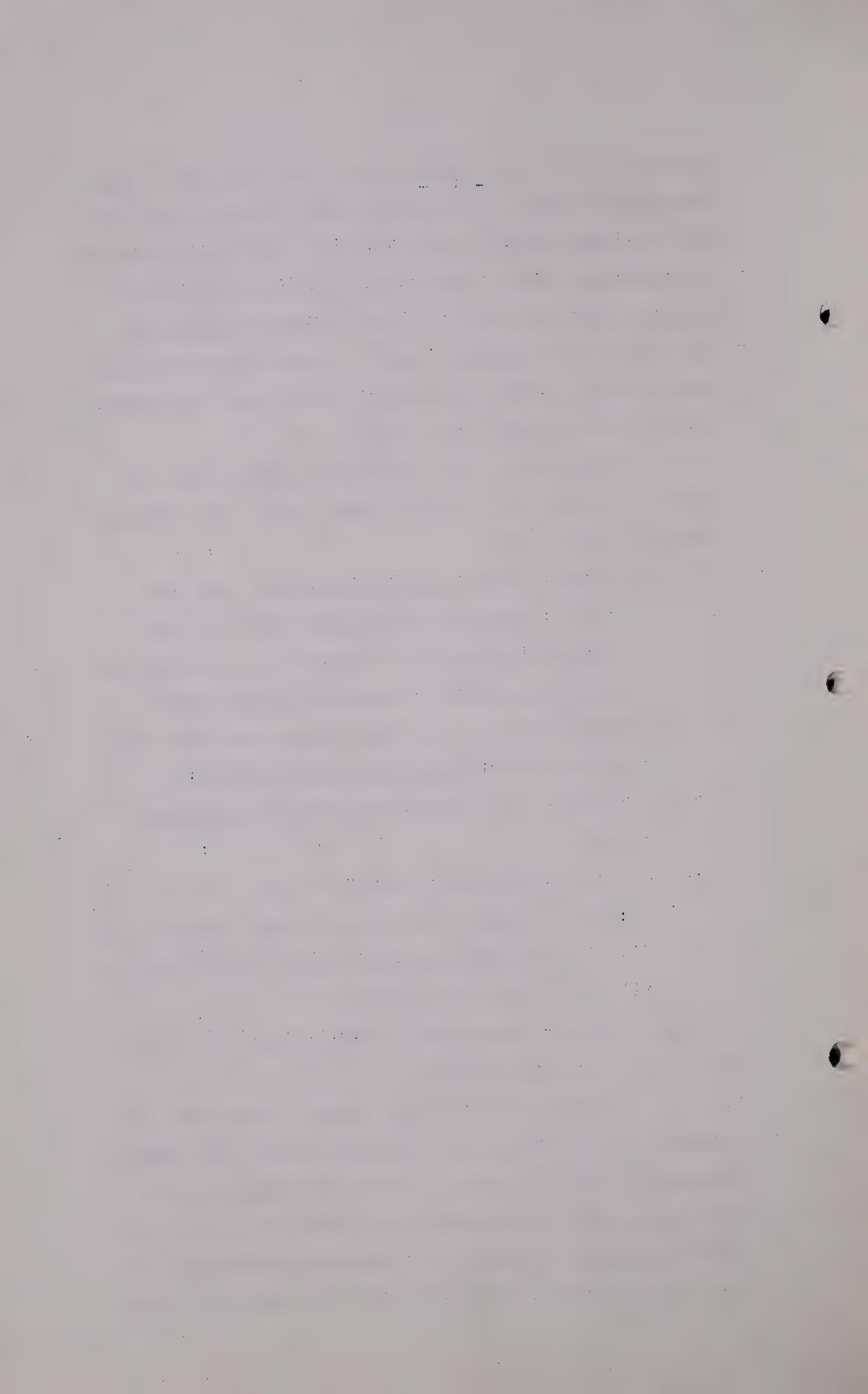
Canadian Western now submits that it is prepared to purchase from Madison the gas which since 1944 has been and will be repressured and stored in the Bow Island field at the well-head price fixed by the Board, multiplied by a discount factor of .315, plus two cents for gathering, compressing and scrubbing costs, subject to the condition that the total initial price for the gas does not exceed one cent per thousand cubic feet.

By Order No. 15, dated 24th April, 1945, as amended by Order No. 16, dated 27th April, 1945, it was provided *inter alia*:

- (a) Subject to the terms of the order the Bow Island agreement was approved for 1945 and thereafter as might be agreed upon between the parties, subject to approval of the Board:
- (b) Royalite was given leave to purchase gas from Madison for delivery to Canadian Western:
- (c) Royalite is to pay Madison for the scrubbed gas:
  - (i) 1.348 cents per M.c.f., or
  - (ii) an amount equivalent to the Turner Valley well-head price per M.c.f. multiplied by the factor 0.31524.

Settlement for gas repressured in Bow Island will be on the basis of the above orders.

Gas repressured in Bow Island in 1946 must be treated as gas purchased by Canadian Western from Madison. The Board does not propose to make its well-head price retroactive for obvious reasons so that the basis of the settlement between Madison and Canadian Western will be the historic well-head price of Two (2) cents per M.c.f.

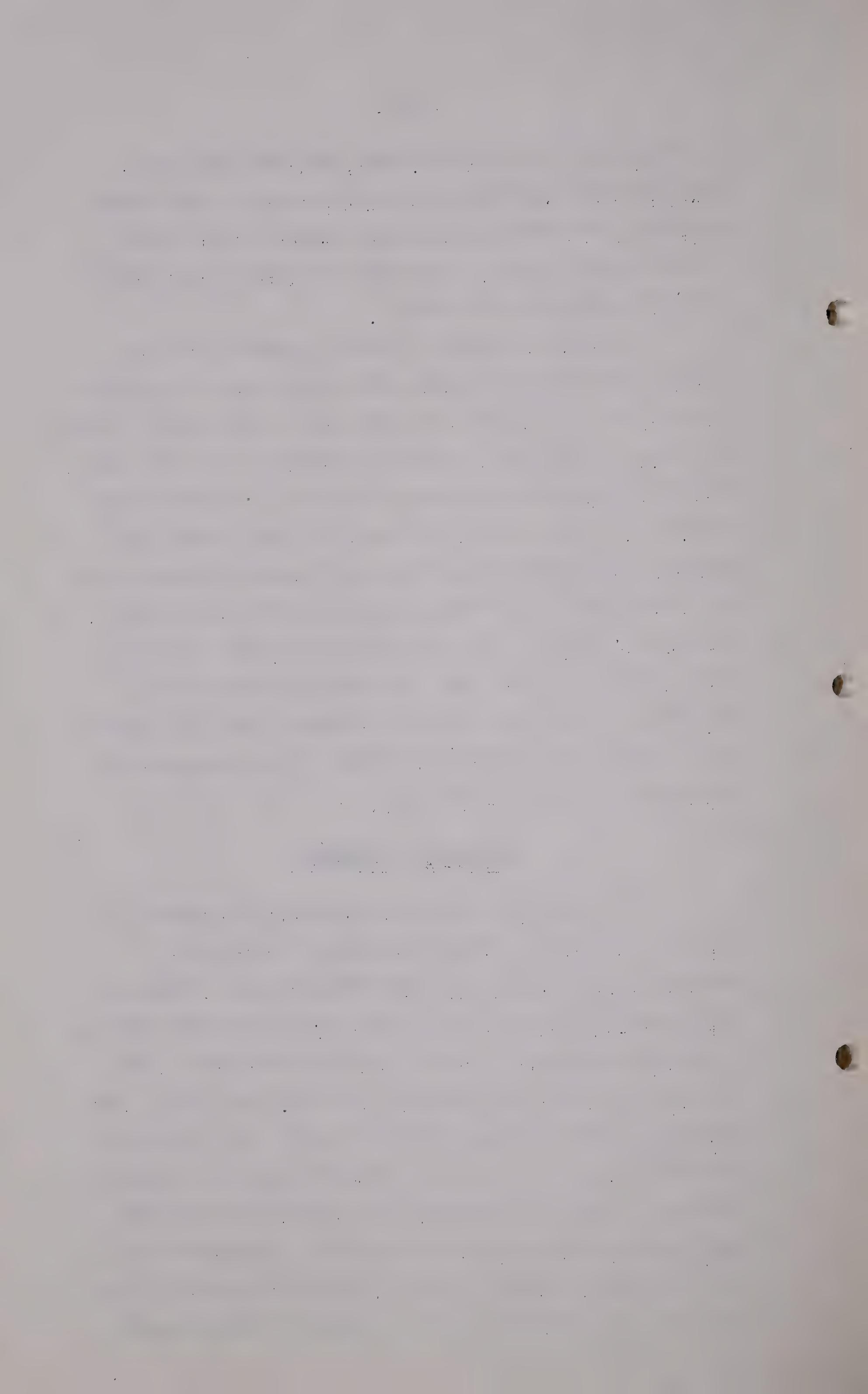


multiplied by the factor 0.31524, plus the gathering, scrubbing and compression costs applicable to the volume gathered, scrubbed and compressed related to the total Madison market share, or upon some equitable basis agreed upon and approved by the Board.

Canadian Western's offer is hedged with conditions respecting contracts with Madison and the possible revision of the contract with the Town of Bow Island. These are matters with which the Board cannot deal at this time. The Board cannot compel Canadian Western to purchase gas for repressuring. It can only say that gas bought from Madison for repressuring whether by Canadian Western or by any other person or company must be paid for at a price. If Canadian Western does not wish to pay that price when it has been determined then, in order that gas be not wasted, the Board may require to consider the installation of the additional equipment in Turner Valley required to repressure it in Turner Valley.

#### RATE BASES - GENERAL

The bulk of authority respecting rate bases is to be found in the reported decisions of Courts and administrative tribunals in the United States. There are two well-defined milestones in the judicial pathway leading to the determination of public utility rate bases. The first of these is *Smyth vs. Ames*, 169 U.S. 466 (1898). The judgment of the Court was delivered by Mr. Justice Harlan who held that the basis of all calculations as to reasonableness of rates must be the fair value of the property used for the convenience of the public. In determining that value regard must be had to the original cost of construction, the amount expended in permanent improvements,



the amount and the market value of its bonds and stocks, the present as compared with the original cost of construction, the probable earning capacity of the property and the sum required to meet operating expenses.

The second is The Natural Gas Pipe Line Case, 42 P.U.R. (N.S.). At Page 138 it is stated:

"The Constitution does not bind rate making bodies to the service of any single formula or combination of formulas. Agencies to whom this legislative power has been delegated are free within the ambit of their statutory authority to make pragmatic adjustments which may be called for by particular circumstances."

And at Page 147:

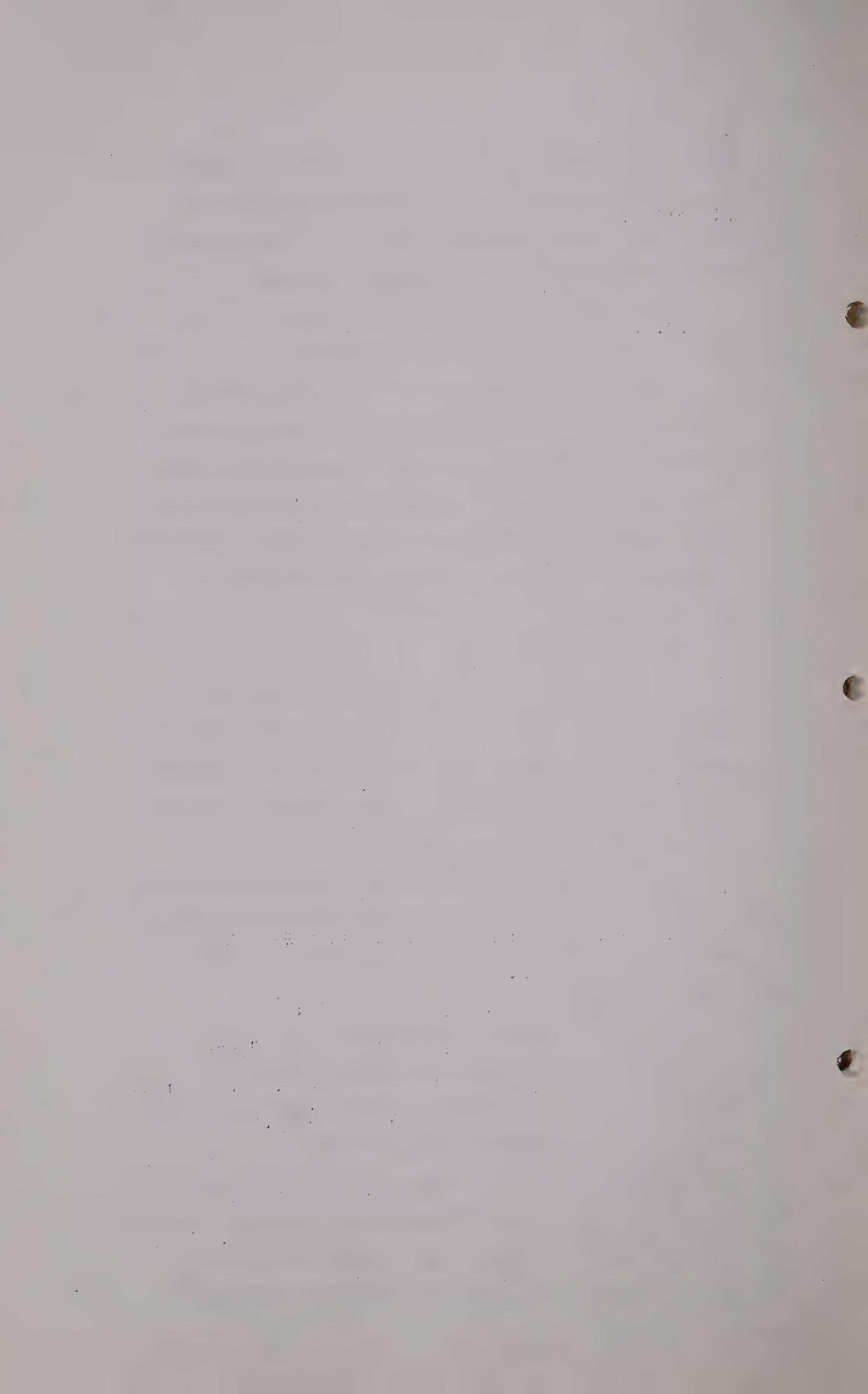
"While the opinion of the Court erases much which has been written in rate cases during the last half century we think this is an appropriate occasion to lay the ghost of Smyth vs. Ames which has haunted utility regulation since 1898."

This opinion has been followed consistently ever since and reference may be made to Hope Natural Gas Company 51 P.U.R. (N.S.) 193; Panhandle Eastern Pipe Line Company, 58 P.U.R. (N.S.) 100.

In the Hope case, it was said:

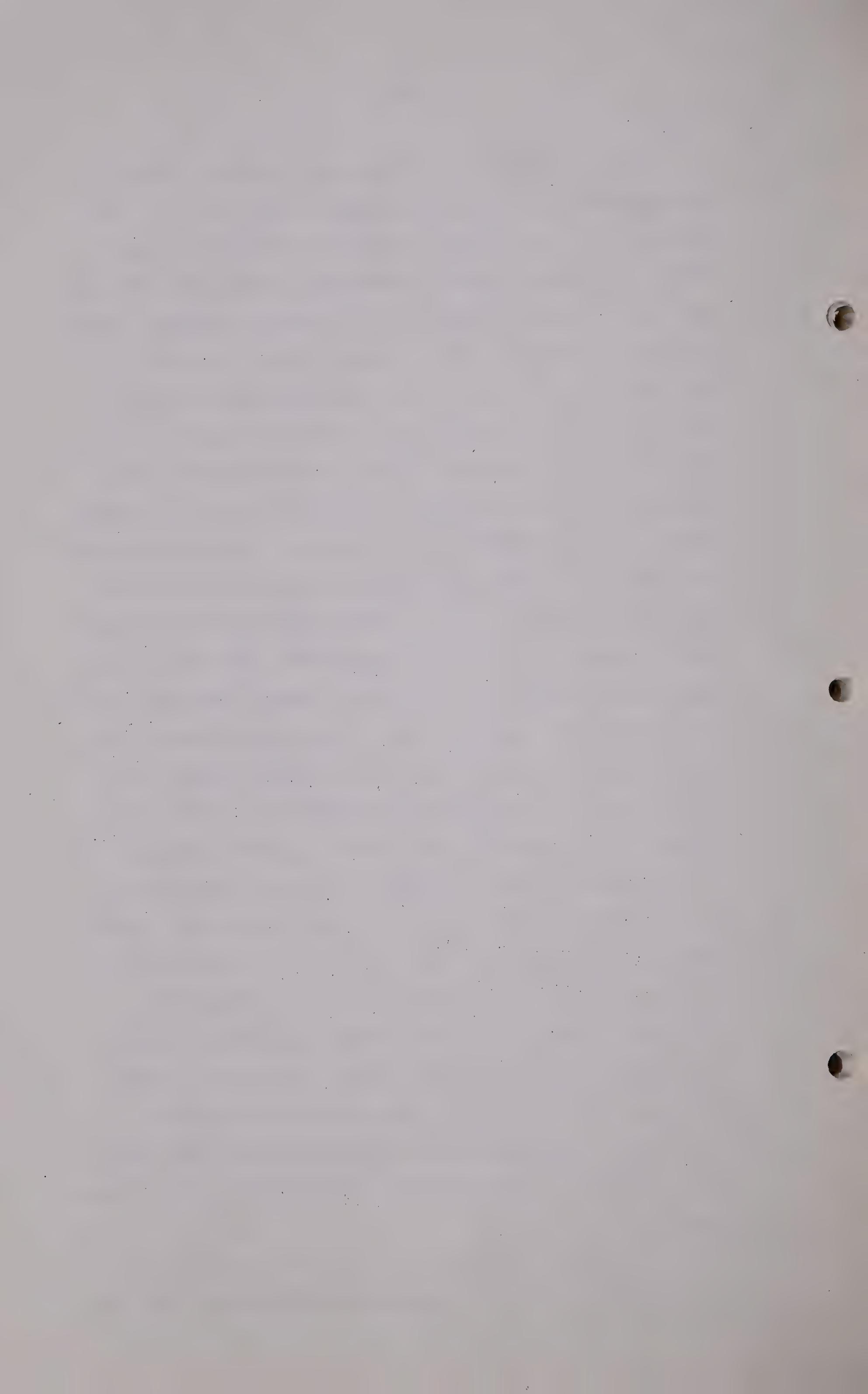
"Under the statutory standard of "just and reasonable" it is the result reached, not the method used, which is the controlling factor."

Between the dates of the two outstanding cases there is to be found a mass of decisions indicating a trend away from the principles laid down in Smyth vs. Ames, culminating in their complete over-throw by the Natural Gas Pipe Line Case.



An indication of this trend is to be found in *Southwestern Bell Telephone Company*, 1923, 262 U.S. 276, in which by a dissenting opinion Mr. Justice Brandeis (with Mr. Justice Holmes concurring) attempted to discard the rule in *Smyth vs. Ames* and to introduce prudent investment as the measure of fair value for rate purposes. In that case, the cost new of the property involved less depreciation was \$31,355,278, whereas the original cost according to the company's books was \$22,888,943. The Commission determined what it termed an adjusted original cost of \$20,456,621 and fixed the rate base at \$20,400,000. The decision was reversed mainly on the ground that the Commission had failed to take into account the prevailing cost of materials and labour which were much higher than when the investment was made. Mr. Justice Brandeis agreed in reversing the decision but on a ground different from that of the majority of the Court. In his opinion, the value fixed by the Commission prevented the utility from earning a fair return on the amount prudently invested. He held that the rule in *Smyth vs. Ames* was legally and economically unsound and that the experience over twenty-five years demonstrated that the rule was delusive. He further held that a rate base, to give capital constitutional protection and to secure reasonable rates to the public, must be definite, stable and readily ascertainable. Implicit in his opinion is the suggestion that when facts are ascertainable, facts should be used instead of opinions and estimates based upon fluctuations in price levels.

The rule in *Smyth vs. Ames* was not applied in the Minnesota Rate case (*Simpson v. Shepard*) 230 U.S. 352,



so far as "reproduction or reacquired cost of land" was concerned but was in fact completely rejected. In Georgia Railway and Power Company vs. The Railway Commission of Georgia, 262, U.S. 625, Mr. Justice Brandeis who delivered the judgment of the Court, said:

"The refusal of the Commission and of the Lower Court to hold that, for rate making purposes, the physical properties of a utility must be valued at replacement cost less depreciation was clearly correct."

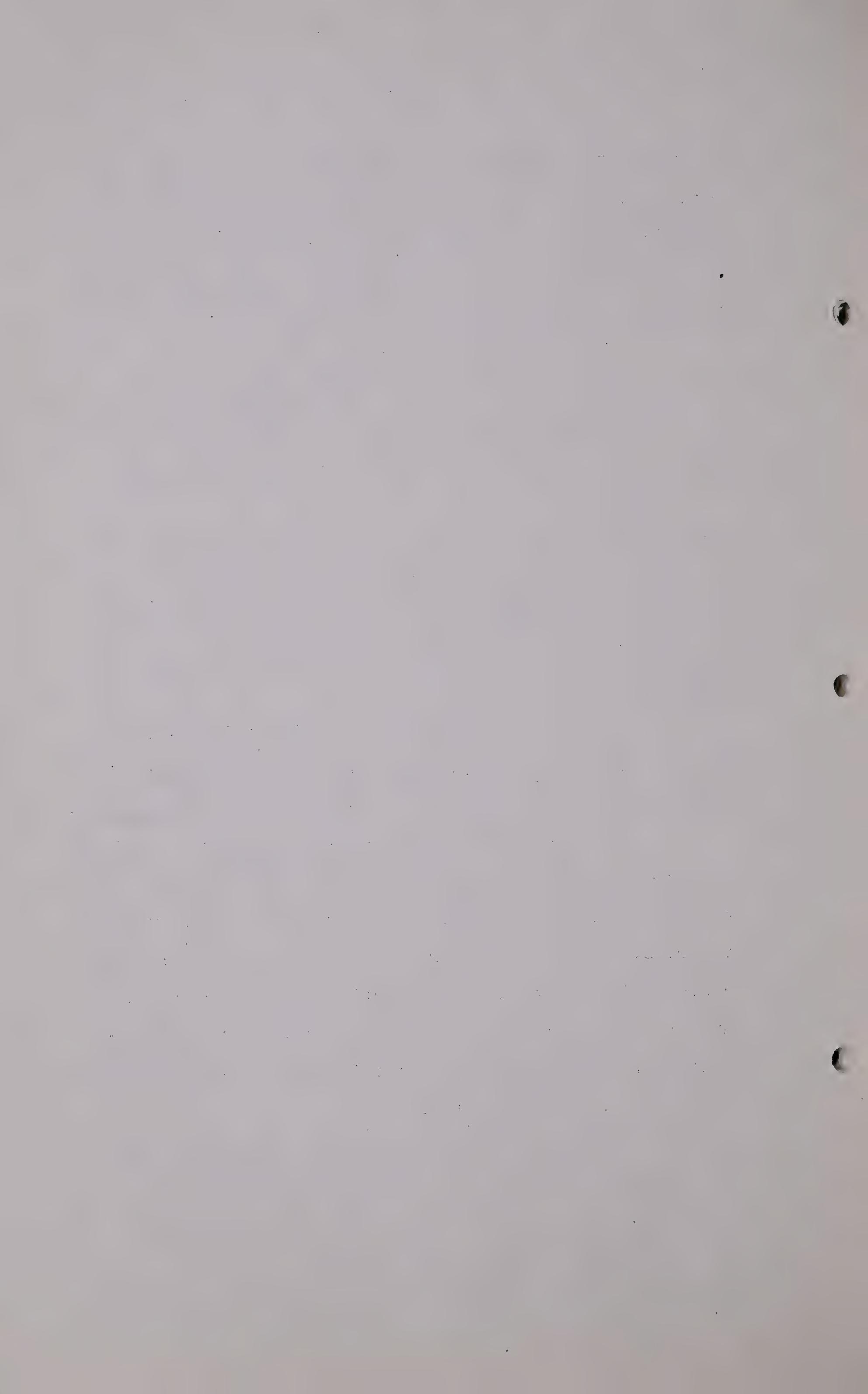
Mr. Justice McKenna dissented and held that the value of the properties should be based on reproduction cost. In this case, the Commission had given consideration to the reproduction cost new theory but rejected it as the measure of value.

In Railroad Commission of California vs. Pacific Gas and Electric Company, 302 U.S. 388, a rate order of the Commission based upon historic cost figures was upheld.

The proponents of the various methods of arriving at fair value for rate making purposes can point to judicial authority which would seem to support all of these various theories, although in general it can be said that reported cases indicate that the reproduction cost theory receives much less support than does historic cost or prudent investment. The following passage is to be found in Valuation of Property, Bonbright 1154:

"Under the influence of these precedents commission regulation has become so cumbersome and so ineffective that it may be said with only slight exaggeration to have broken down."

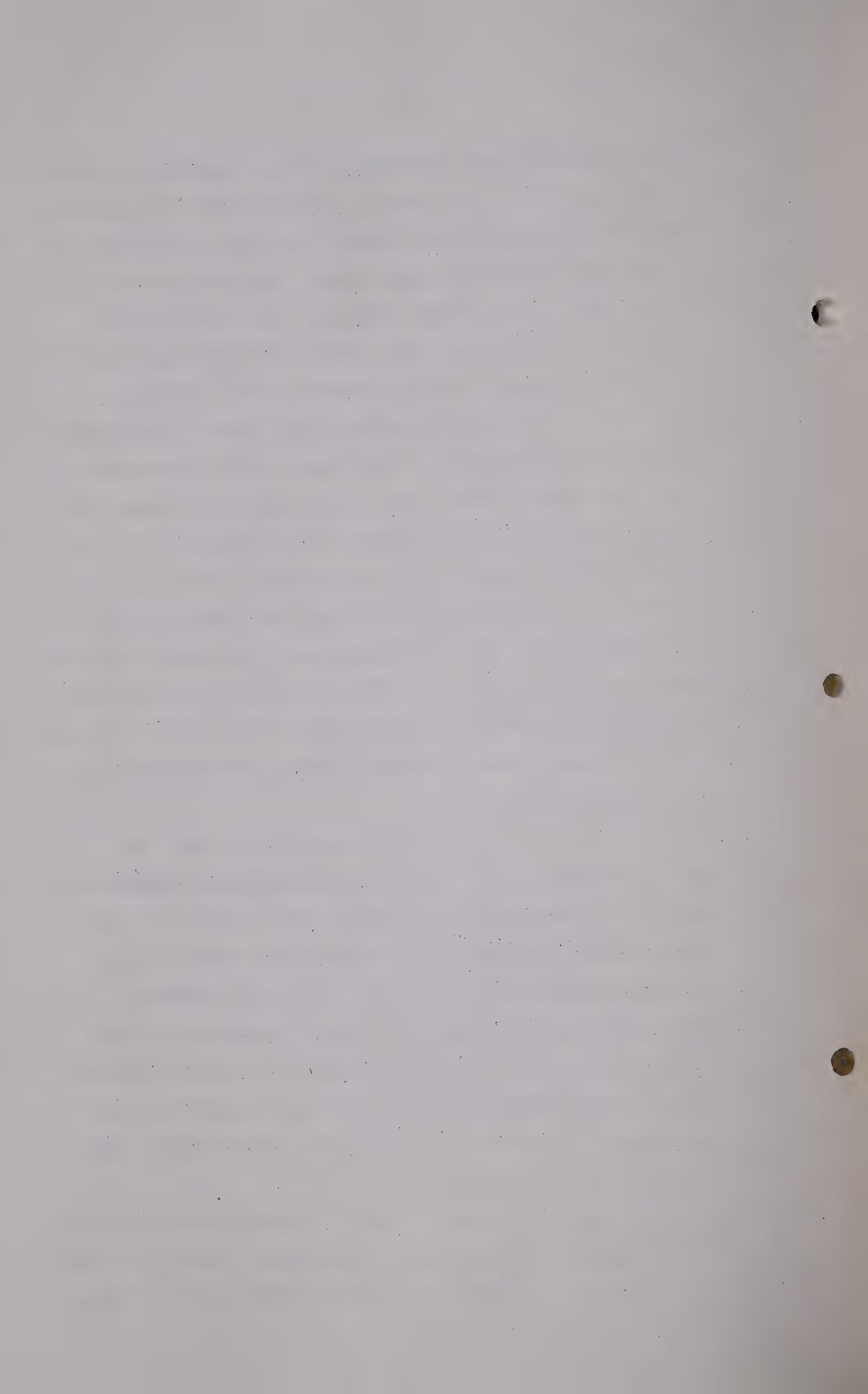
Cases in the United States Courts are principally directed



to the constitutional problems which are involved in rate making and so far as the Board can detect do not prescribe the use of any particular formula for the determination of a rate base. *Smyth vs. Ames* merely laid down certain matters which rate making tribunals must consider in arriving at a decision. The Natural Gas Pipe Line case abrogated the rule, leaving administrative tribunals a free hand in the methods employed so long as constitutional rights be not infringed. The value of these judgments in this jurisdiction lies in the discussions concerning and the analyses made of the various rate making theories and it is to that extent only that the Board has placed reliance on the cases cited and the many others read by it. A conclusion might be reached and the decision in the Hope case would appear to justify it that fair value for rate making purposes is not necessarily the same as either original cost, historic cost or present reproduction cost less depreciation.

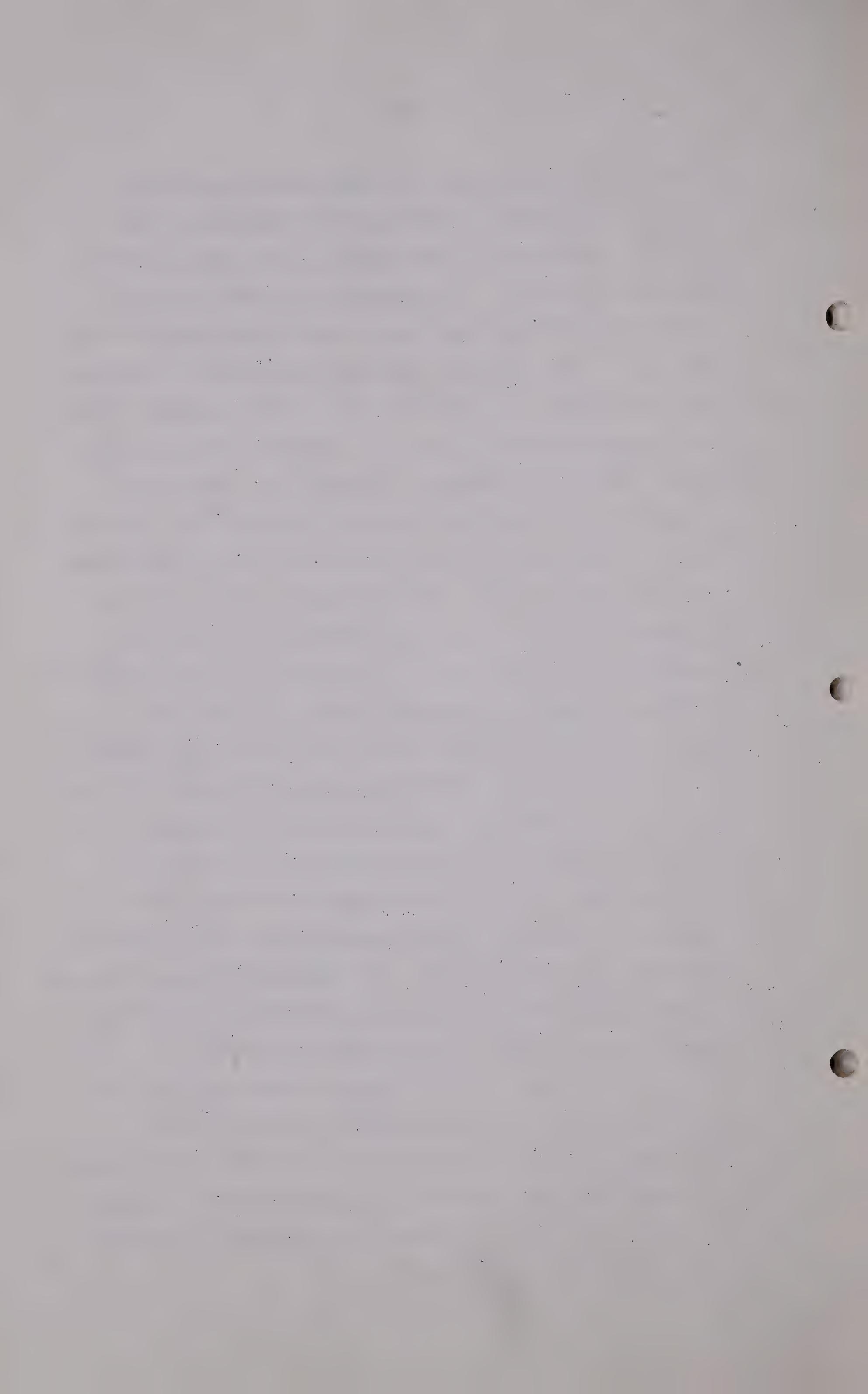
In our own jurisdiction, historic cost was applied in 1926 by the Board of Public Utility Commissioners in *re Canadian Western Natural Gas, Light, Heat and Power Company Limited*. *In re Valley Pipe Line Company Limited*, a Commission, of which the late Mr. Justice McGillivray was Chairman, determined the company's rate base on the basis of reproduction cost now less depreciation. That decision, however, was based upon "present" rather than fair value and it is the latter concept that this Board has in mind.

At this point, it may be convenient to deal with the submission made by Counsel for Madison, which in effect is that the same principles must be applied by the Board



in determining fair value for rate making purposes as would be applicable if the Board were determining fair value in expropriation proceedings or in a case involving compulsory purchase, his argument being that if reproduction cost new were not used, confiscation would be the result. He cited English authority in support of the contention that no one can be deprived of his property without due compensation unless there is express authority given. If the Board were acting as a tribunal in cases of expropriation or compulsory purchase, it would feel impelled to take cognizance of these authorities and to follow them within the limits which the facts might require. That, however, is not the duty cast upon the Board under The Natural Gas Utilities Act. It is charged with the determination of just and reasonable rates. It does not appropriate or confiscate any property either of Madison or any other company. Utility companies concerned in this hearing will retain the ownership of their property - dedicated it is true to public service - and enjoy the fruits of its use, with an allowance for depreciation designed to recapture invested capital, and with reasonable protection from competition. The Board can find no parallel between valuations made for rate purposes and valuations made to meet the case of deprivation of property.

Original cost of a plant is the total cost as shown by the Company's accounts and depends for its validity upon the accuracy of those accounts. For instance if replacements or other capital items have been charged to operations, the accounts will not reflect the original cost of the existing plant.



Historic cost - which is usually used where records and accounts are incomplete - is an estimate of what the component parts of the plant would have cost at the various times of construction, the estimates being arrived at by making valuations based upon prevailing prices at those times.

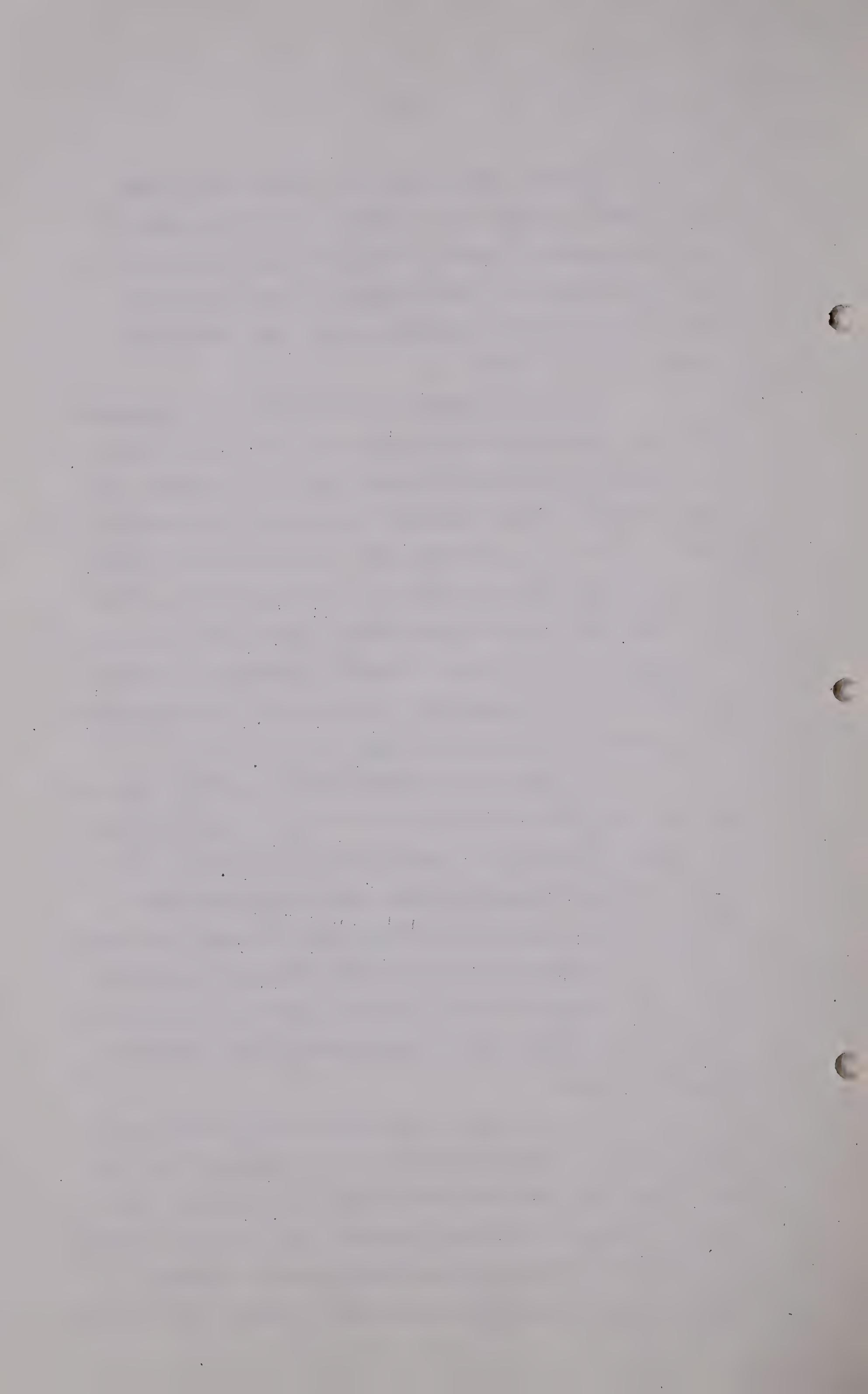
Prudent investment cost involves the elimination from original cost of items of property no longer used or useful or expenditures improperly made. The Board, however, considers that original cost and prudent investment cost are the same, at least until the contrary be shown.

Reproduction cost is the estimated cost of reproducing the property at the price levels prevailing at the date of the valuation, which is generally at or about the date of the hearing, with an allowance for depreciation related to the existing condition of the plant.

The advantage of using original cost as a measure of value for rate purposes is that it is at least factual, is easily ascertainable and is certain and stable and does not depend upon estimates based upon assumptions made by those whose personal predilections may influence the result.

When original cost is not completely ascertainable, resort may be had to historic cost which depends upon price levels at the time of construction with adjustments where necessary.

The reproduction cost new theory presents many difficulties, if not absurdities. If a valuation on this basis (assuming its complete accuracy) is made at a time when price levels are below original cost, then the utility is denied a return on its capital prudently invested. If this method is adopted it necessarily follows that the rate



base must fluctuate with the changing price levels so that at one period the utility may be earning a rate of return on a rate base which is greater than the actual investment and may be earning a return on a lesser rate base at another period. In one case there is injustice to the consumer and in the other, injustice to the utility.

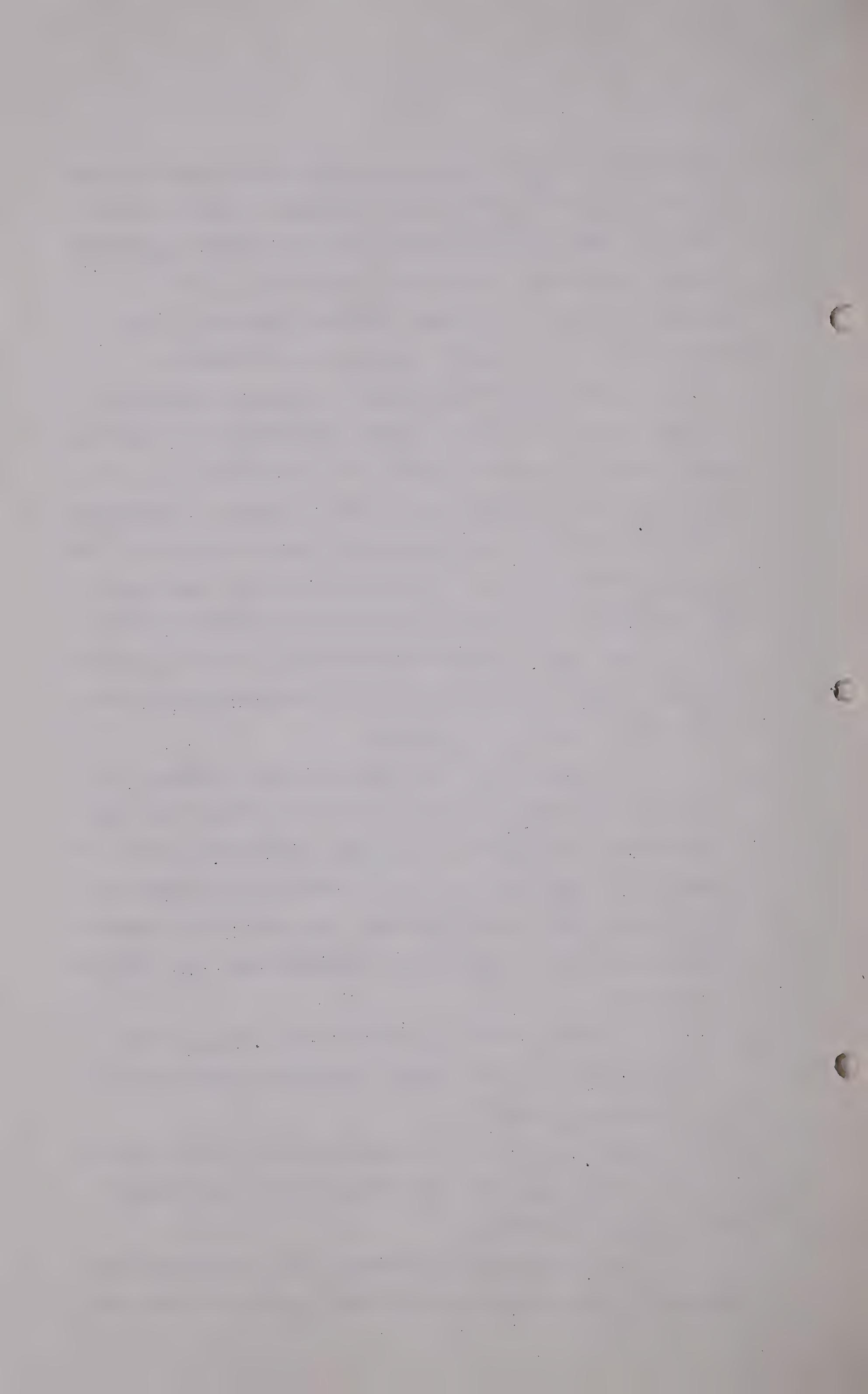
Does the reconstruction now theory contemplate a duplication of existing property no matter what technical improvements have been evolved in the meantime or does it mean the cost of constructing a plant capable of performing the same service as the old but with greater efficiency and at less cost? It may be asked why should the consumer be called upon to pay rates based upon the reproduction cost of a plant, which, although still capable of giving service, is inefficient in comparison with a completely modern plant and is more costly in operation.

In *McArdle vs. Indianapolis Water Company*, 272 U.S. 400, the Supreme Court of the United States held that reproduction cost should be estimated within the limits of reasonable practicability upon the basis of the identical property used for public purposes, subject to an allowance for depreciation, inadequacy or obsolescence. Mr. Justice Butler said:

"There is to be ascertained the value of the plant used to give service and not the estimated cost of another plant."

If that be correct then the consumer may be called upon to pay rates based upon the cost of reproducing an obsolete and costly undertaking.

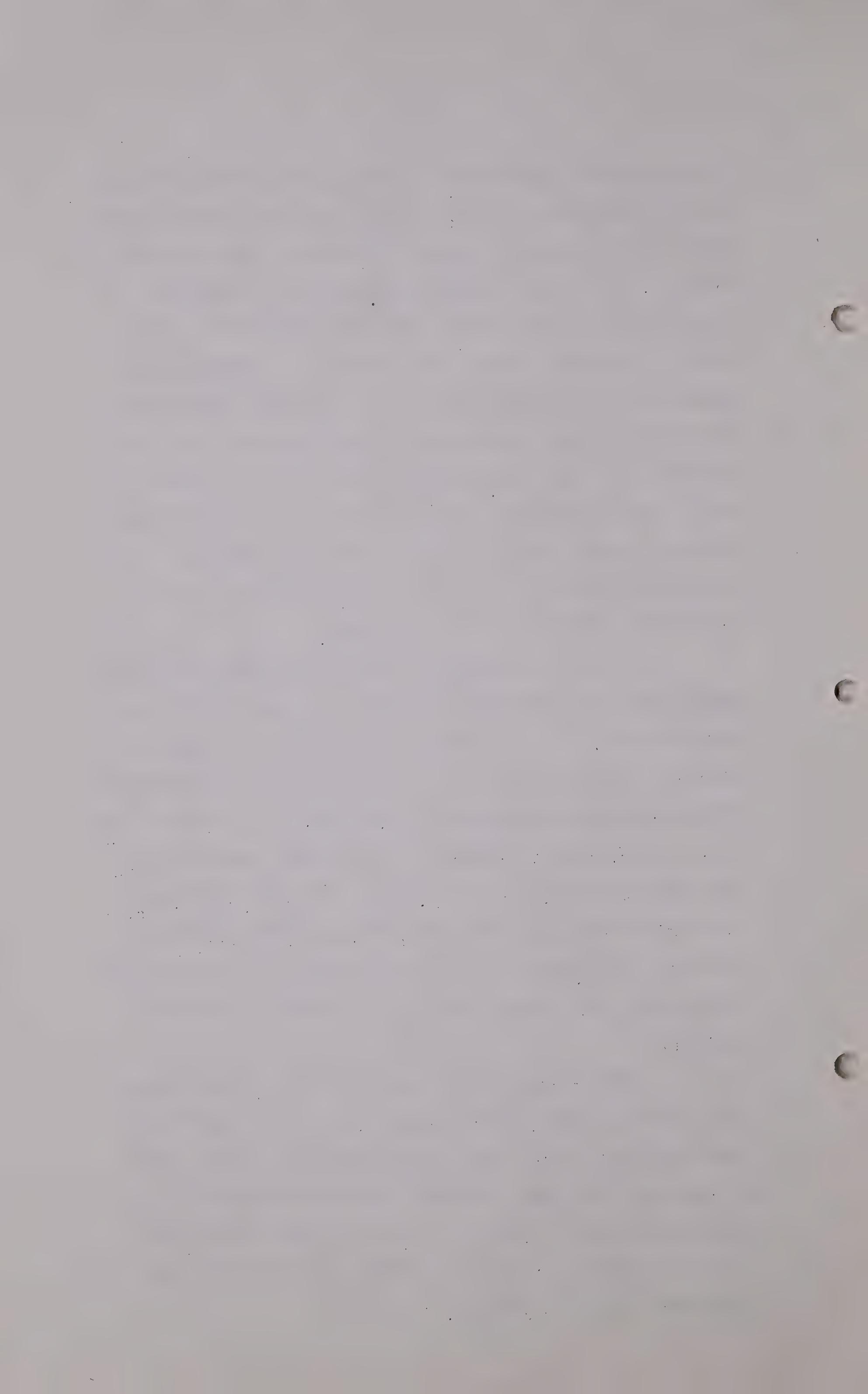
In preparing valuations on the reproduction cost theory, it is usual to ascertain unit costs and apply them



to the various quantities in arriving at the final figure. It will be readily apparent that a trifling error in unit costs can have a serious multiple effect upon the final result. Unit costs arrived at when price levels are different from those which obtained at the time of construction must necessarily be based upon estimates and opinions which in turn rest upon assumptions related to construction conditions, labour conditions, the use of contractors or the building of a plant by the utility itself, transportation costs and so on. The application of those factors could result in entirely different unit costs being arrived at by different engineers and the results would not reflect fair value.

A utility company not subject to regulation may enter upon a construction programme in a period of high price levels. If the proprietor subscribes to the theory that reproduction cost new is the only basis of value and if the company is subjected to regulation at a time of low cost prices, then logically the proprietor must suffer a rate base on the lower level. The adoption of that principle might result in the bankruptcy of the utility and could and probably would seriously affect the security of bondholders and the ability of the utility to attract capital.

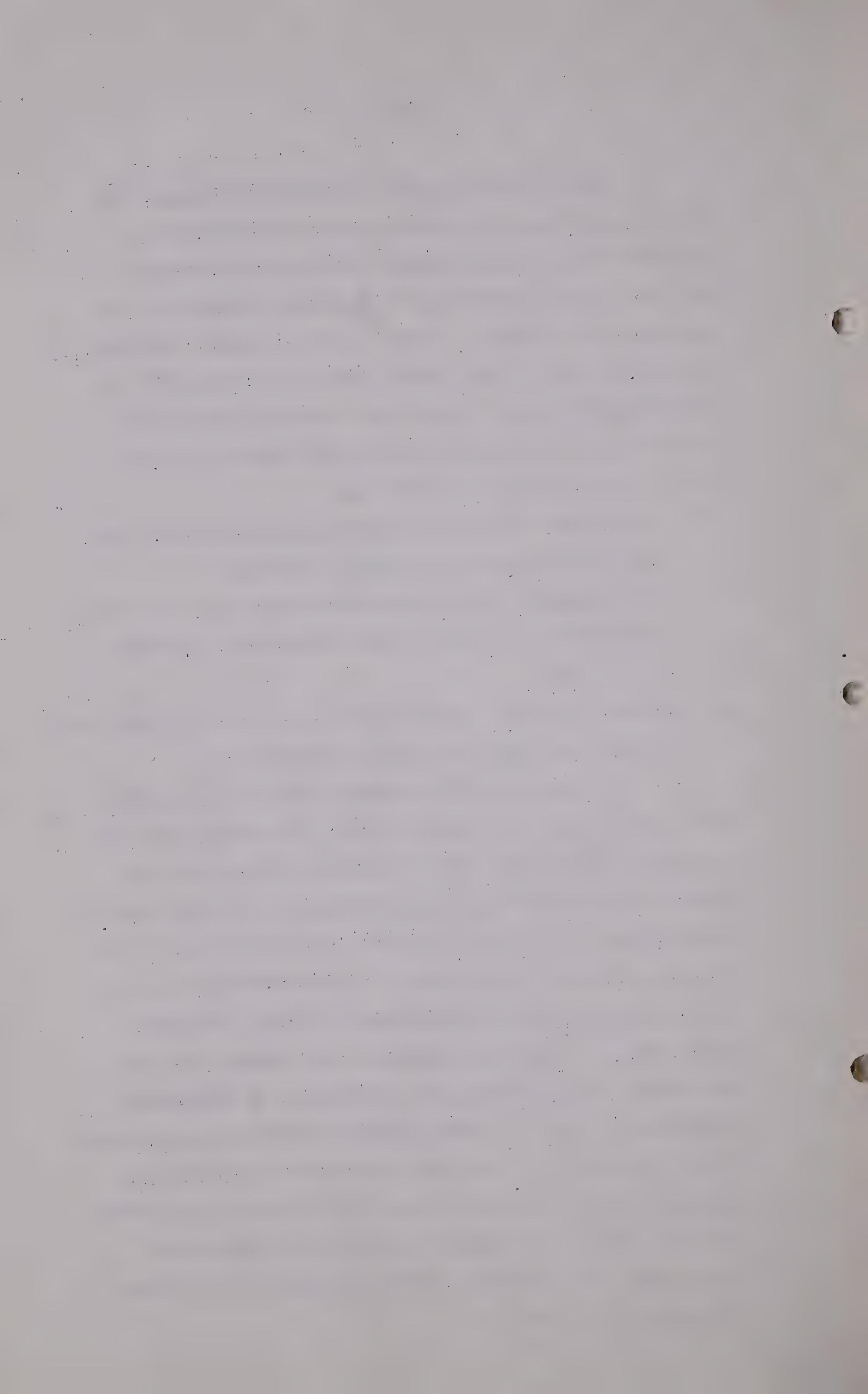
The utilities concerned in this hearing contend that additions and installations ordered or permitted by the Board must be included in the respective rate bases at cost but they also say that plant and equipment used and useful at the date when they came under regulation should be included in the rate bases at present replacement cost less depreciation.



Before dealing with the detailed evidence respecting rate bases, the Board desires to discuss the evidence of Mr. Andrew Stewart, Associate Professor of Economics in the Department of Political Economy in the University of Alberta. In his opinion, neither exchange value, sales value, nor earning value, is applicable in the determination of a rate base and that cost is now recognized as relevant to the determination of utility rates. In relation to cost he says:

1. The allowance should be based upon cost and not upon evidence of capacity to derive earnings.
2. The allowance should not include any element of "cost" which is attributable to the monopolistic position of the utility.
3. Factual evidence in particular cases is to be preferred to the application of general formulae.

He discussed the original cost and reproduction cost now theories and compared them. He pointed out that original cost provides for a relatively fixed rate base whereas reproduction cost will result in a rate base which will fluctuate with price levels. His opinion is that if adequate records are available, the determination of the rate base by original cost methods is to be preferred. This system is simple, systematic, and reduces the time and expense of proceedings to a minimum. In discussing reproduction cost he considered that continuous application of that principle is required, that it is expensive and uncertain; that the basic concept of the method is obscure and that there is no precise procedure for appraisals unless some rule-of-thumb method is adopted as an administrative expedient.



The effects of the application of reproduction cost if continuously applied would be to affect utilities with the same irregularities which apply to unregulated industry, whereas under original cost the irregularities would be reduced.

The reasonable expectations of investors is that in periods of high prices they would get high returns and in periods of low prices would get low returns. If then a high appraisal is used in determining the rate base and if a constant return is given on that rate base, investors get more than their reasonable expectations.

Even if reproduction new were to be adopted, Professor Stewart did not think that 1943 figures should be used since the war had had some effect in increasing costs.

In his discussion of depreciation as applied to a rate base under determination, the witness stated that he did not like taking book records for initial valuation. In adopting the principles arising from this evidence and adopting the historic cost approach to this problem, the Board is following the precedent set by the Board of Public Utility Commissioners and proposes to continue to do so during the present incumbent's term of office.

Adopting historic cost, subject to certain exceptions mentioned later, the Board is not unfair to the utility in that its rate base will only be varied by additions less depreciation so that its investment subject to depreciation is preserved to it irrespective of changing price levels. The economic theory of alternative opportunity can have no practical application in the case of the companies involved nor does the question of exchange value arise.



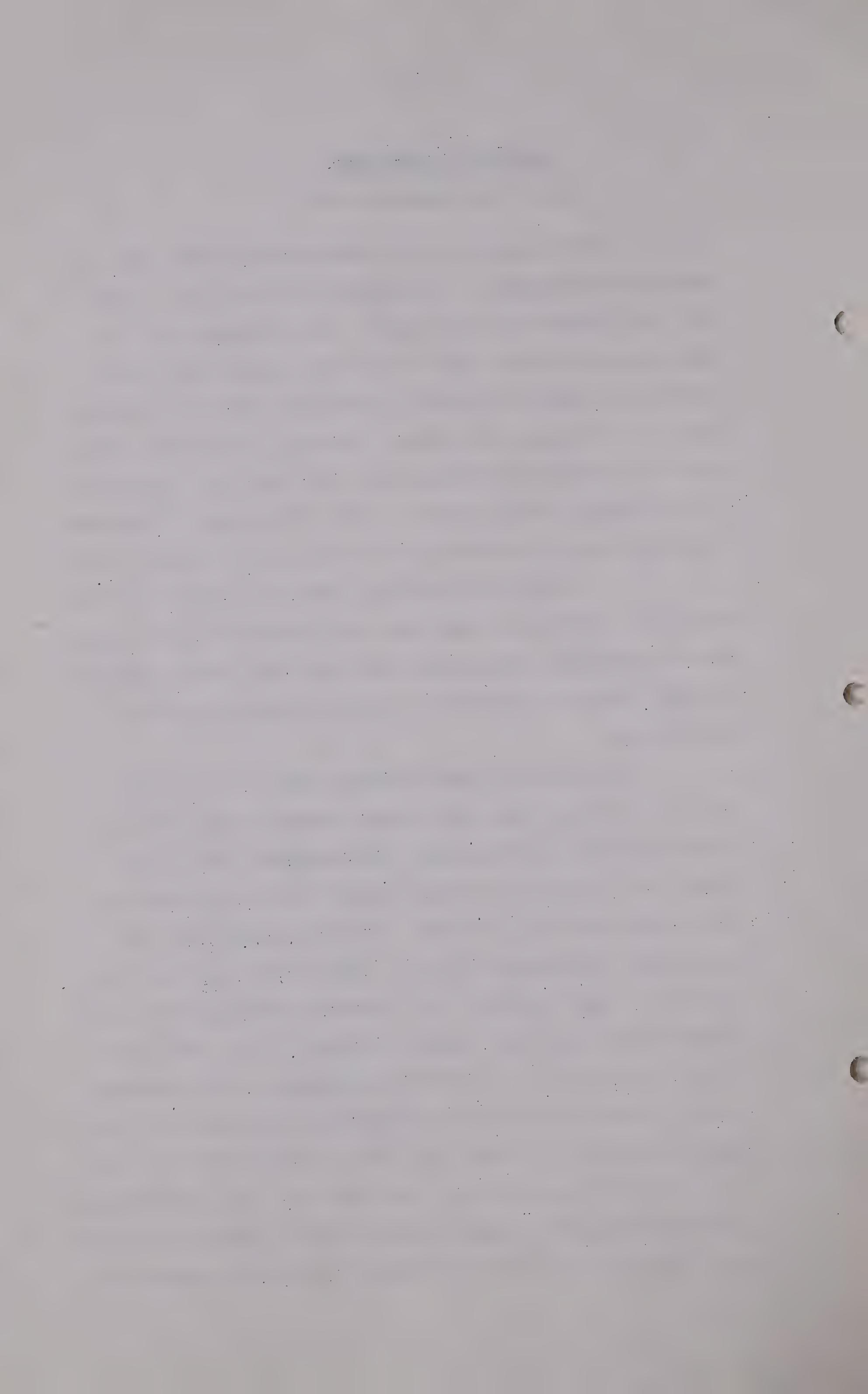
MADISON'S RATE BASE

(As at 1st January, 1944)

With respect to the installations taken over by Madison from Royalite, a valuation was made by Mr. Edgar Hill, an engineer of high repute. He subscribed to the production new theory and if the Board agreed with that theory it - subject to some adjustments - could reasonably accept his figures. The Board, however, has decided otherwise and prefers to determine the rate base by ascertaining the investment of the utility either by the use of accounting figures where available or by the use of historic cost.

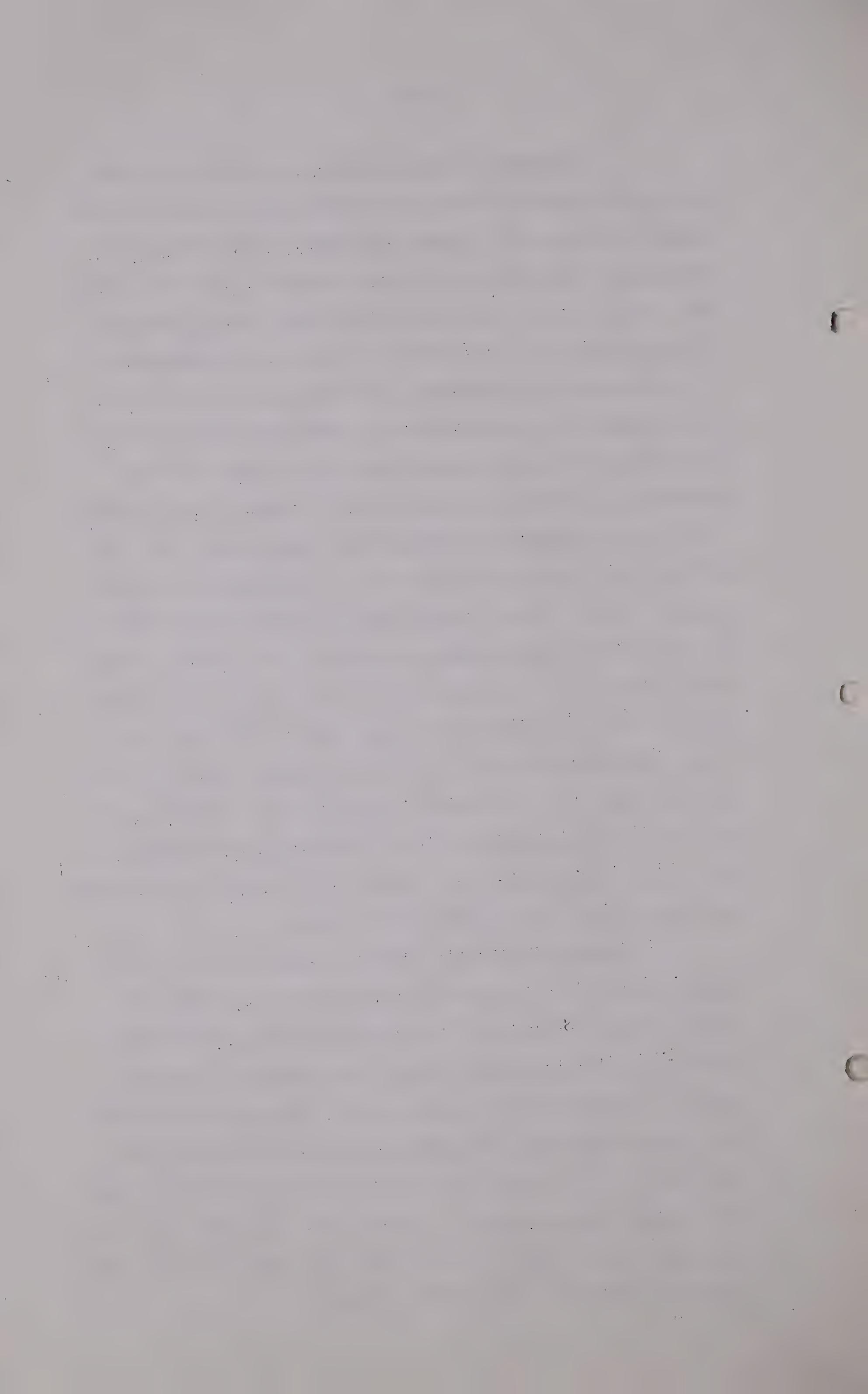
It might be pointed out that Mr. Hill's valuation was made in 1943 at a time when the increase in price levels was approximately twenty-five per cent over those prevailing in 1939, which he considered could be taken as being a normal year.

In compiling unit costs he used labour cost figures slightly lower than those current in 1943 but to what extent he could not say. His trucking costs were placed at 4 per cent whereas Madison's trucking costs in 1944 were only 1.2 per cent. In other cases, Mr. Hill explained discrepancies in unit costs by the fact that he just used round figures. He, however, considered that the Board should have some regard to historic cost, the value of the service given and the past earnings of the company. In his first valuation of the Seaboard scrubbing unit, he made no allowance for the fact that although still in use it was obsolete, or for the fact that the cost of operating the Seaboard unit is much greater than the cost of operating the Girbotol unit, which was installed some few years ago.



He determined depreciation on an observed basis although he advocated the use of unit depreciation for the future. It might be pointed out that he depreciated the compressors at 2 1/2 per cent per annum but did not apply that factor to the buildings which house them, although the buildings will have the same life as the machinery. He depreciated the fan house by fifty per cent although the evidence indicated that it is obsolete and must soon be replaced. The gathering lines on the basis of the depreciation used by the witness will have a future useful life of one hundred and twenty-five years, while the life of the field is now estimated to be a maximum of thirty years. On the other hand he applied reproduction cost to equipment installed during and owing to the stress of war, and his resultant valuation fell far short of the actual cost of these installations. In doing so Mr. Hill was quite consistent but in the Board's concept unfair to the utility company. The result arose from the accident of the date of construction. Other similar matters could be mentioned demonstrating the infirmities of the reproduction cost new theory as a basis of valuation.

Some contentions advanced by Mr. Hill must be given weight. He suggested that an amount of nine per cent should be included in the rate base to cover intangible costs such as engineering, supervision, interest during construction and legal costs. It must be conceded that such costs are necessarily incurred in construction and unless these costs have actually been capitalized, an allowance should be made to cover them. In this case, they were not capitalized and since nine per cent is a fair and reasonable amount, it will be allowed.

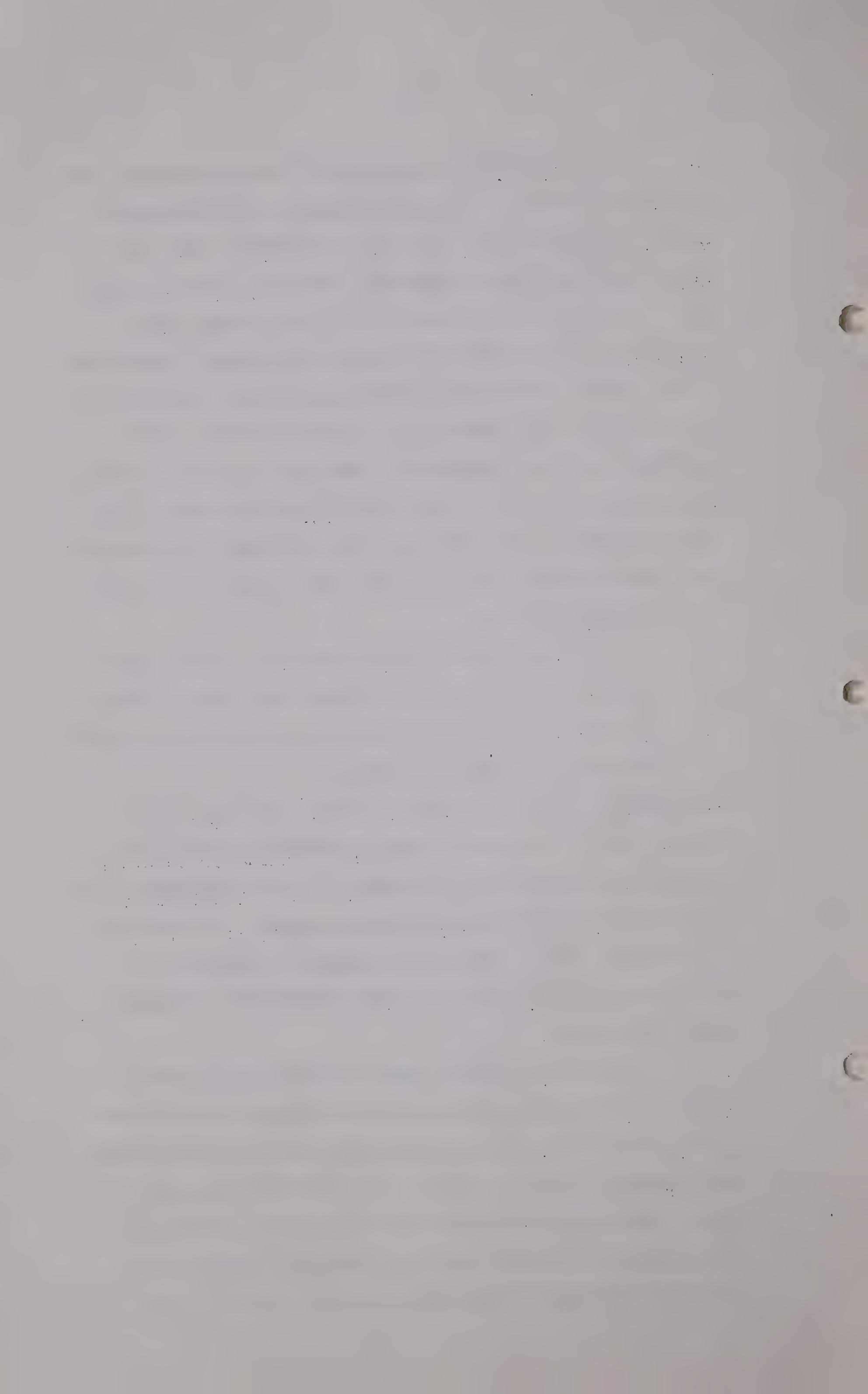


Mr. Hill further suggested that the business had a going value apart from physical value and his suggested figure is \$200,000.00. Had the reproduction cost new theory been adopted no allowance could be made for going value. The witness outlined reasons why going value should be allowed, many of which do not commend themselves to the Board. Going value arises only when a business is successfully established, has customers and has been successful in its operations. Obviously a plant in successful operation has some value apart from the value of its various parts. This principle was recognized in *Knoxville vs. Knoxville Water Company*, 212 U.S. 1, when it was said that going value was:-

"The added value of the plant as a whole over the sum of the value of its component parts which is attached to it because it is in active and successful operation and earning a return."

The recognition and application of the principle must, however, depend upon the valuation method adopted and as it appears to the Board must relate to the earnings of the utility rather than to the physical assets. If original or historic cost be used as the basis of valuation, it would seem just and fair that some additional allowance should be made.

It, has, however, been said that no separate allowance for going value should be included in the rate base. The Board, however, considers that fair value must lie somewhere between original and reproduction cost. Thus, while objection might be taken to the arithmetic appearance of the rate base as determined herein, the arithmetic method is designed so as to arrive at fair



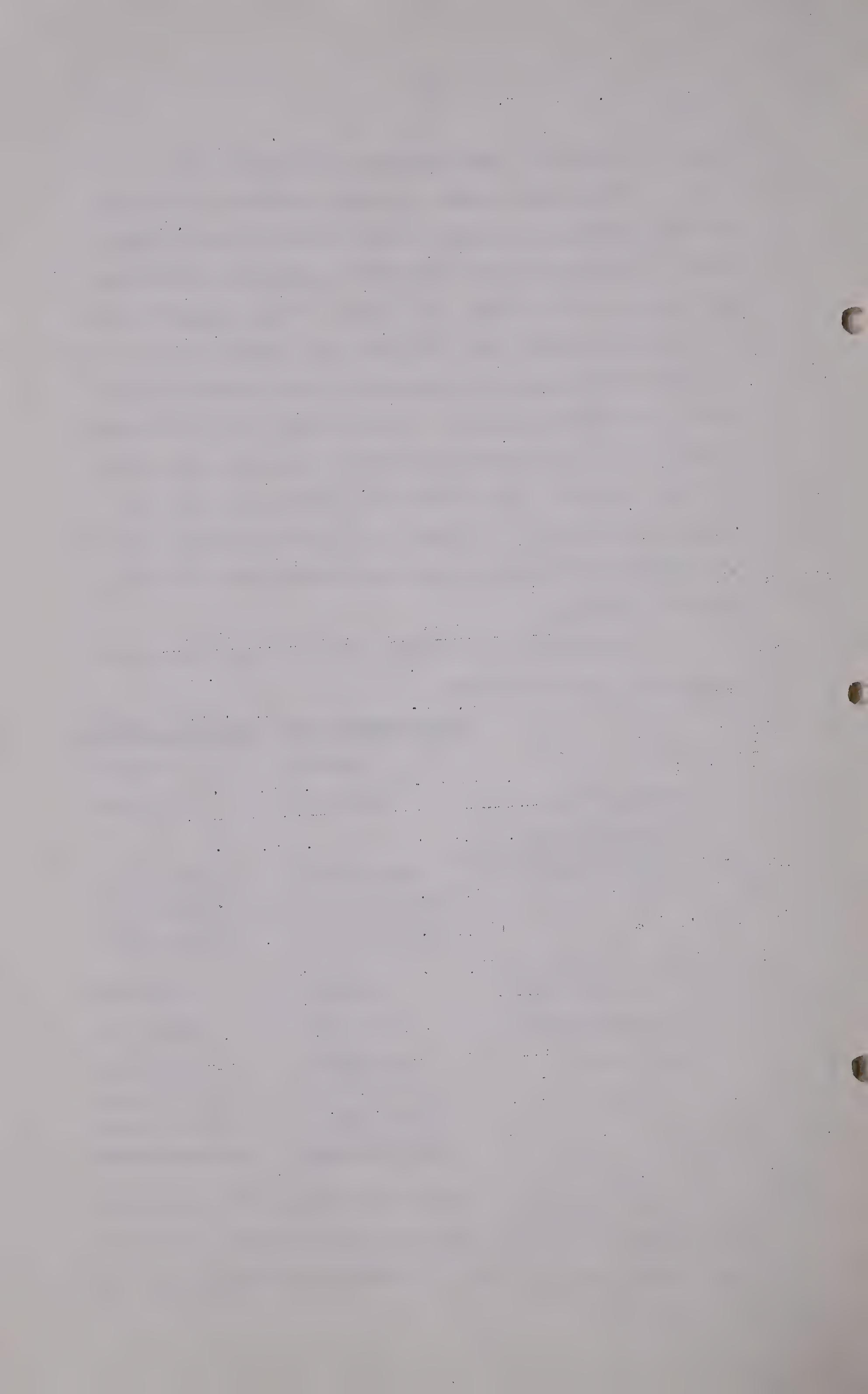
value as opposed to mere original or historic cost.

Royalite, however, did not disclose the earnings of its natural gas division or any other relevant factor which would permit of any scientific method of determining the amount to be allowed. Mr. Hill's figure of \$200,000.00 is obviously picked out of the air, but it is less than ten per cent of his original valuation of the physical assets including working capital. In the absence of satisfactory evidence as to the proper allowance to be made, the Board is of the opinion that if five per cent is added to the value of the physical assets, not including working capital, the result will represent the fair value of the property for rate purposes.

Mr. Hill's preliminary value of the plant on the reproduction new basis was:

	<u>Reproduction New</u>	<u>Less Depreciation</u>
Land	\$ 630.00	\$ 630.00
Rights of way	3,225.00	3,225.00
All other plant including furniture and fixtures	2,606,458.00	2,130,785.00
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	\$2,610,313.00	\$2,134,640.00
Adjusted general over-head costs	3,789.00	3,324.00
Working capital	190,000.00	190,000.00
Going value	200,000.00	200,000.00
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	\$3,004,102.00	\$2,527,964.00
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As a result of cross-examination, Mr. Hill agreed that certain adjustments should be made with respect to the obsolescence applicable to the Seaboard purifying unit and



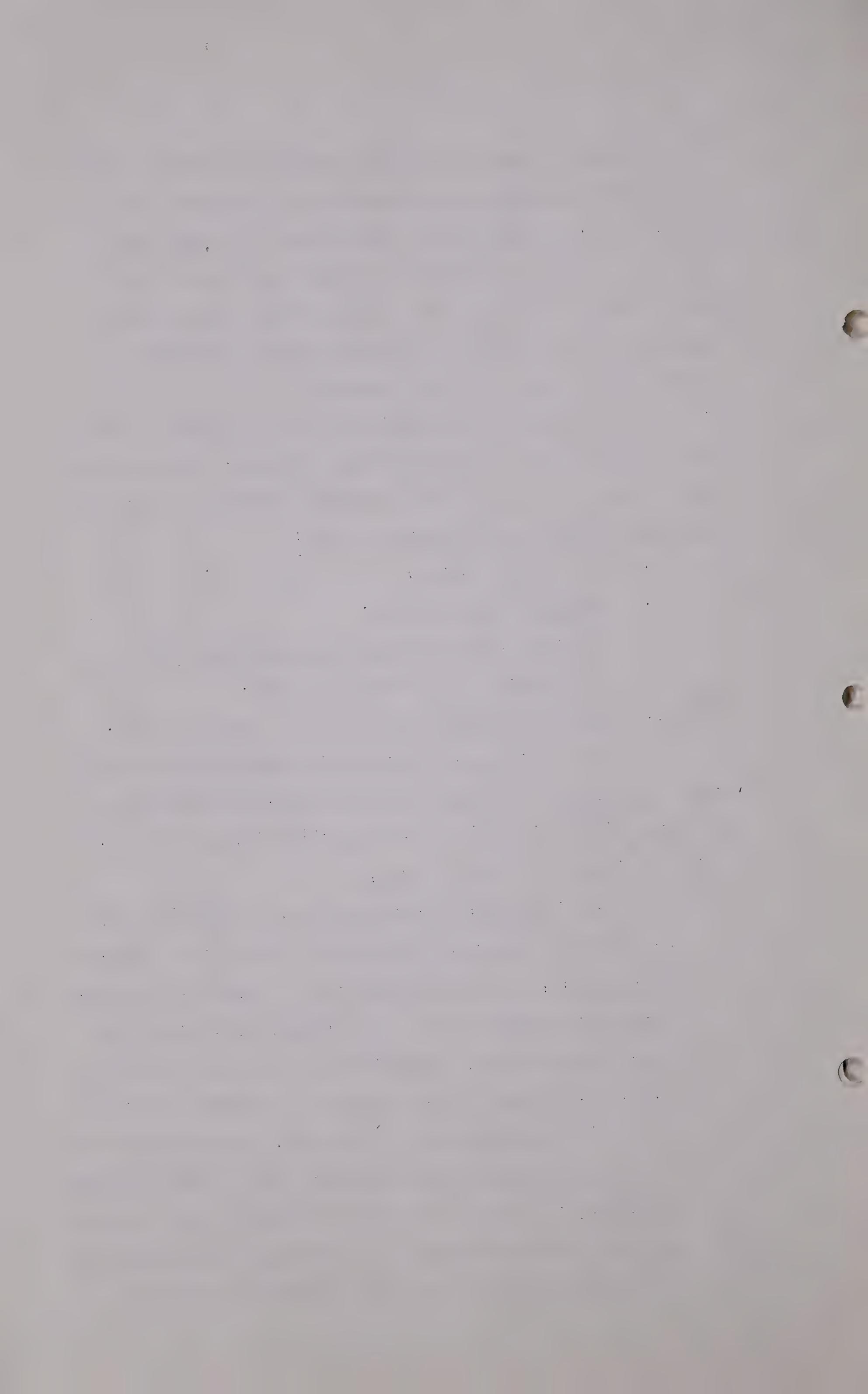
to the royalty payable to the Girbotol Corporation. From this cross-examination and from evidence subsequently given by Mr. Stevens-Guille with respect to these items it would appear that Mr. Hill's final appraisal of the whole plant, including land, rights-of-way, going value, working capital, overhead costs and prepaid Girbotol royalty is the sum of \$2,443,988.00.

Accrued depreciation must be applied to a valuation no matter on what basis it may be made. This subject provoked much discussion and argument during the hearing. The various suggested approaches were:

1. Book depreciation.
2. Observed depreciation.
3. Straight line depreciation based upon life expectancy of the various assets.
4. Unit depreciation related to a wasting asset.

The Board must reject book depreciation in this case as a proper principle to be applied, notwithstanding the provisions of Section 49, Subsection (2) of the Act, which is in the following terms:

"In fixing and determining prices or values of any real or personal property for any of the purposes of this Act, the Board shall not be bound by the price paid by the owner or the replacement cost or by any book values however established by the owner for such property, but may adopt any basis or formula which to it shall appear just and reasonable, and in particular and without restricting the generality of the foregoing the Board in fixing such prices or values shall determine the just and reasonable allowance for depreciation and in so doing may take into account depreciation

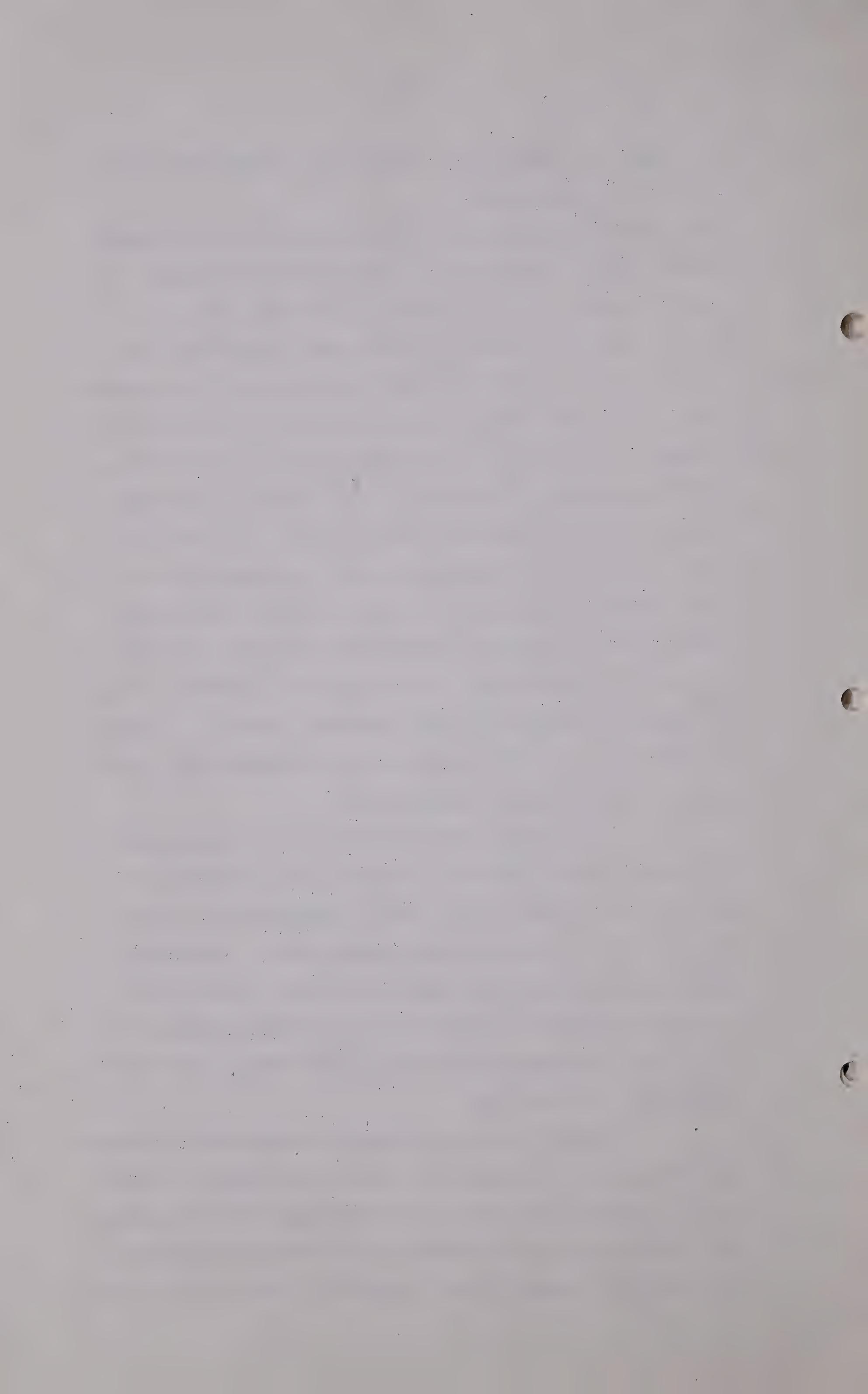


already taken by the owner or any antecedent owner of such property."

Book depreciation in most cases is an accounting concept and may have no relationship to depreciation proper. It may be accrued at the expense of dividends; it may be related to life expectancy or to local taxation or to income tax or even to the whim and caprice of the accountant. It may not afford any real guide to a rate making tribunal. Observed depreciation can and in fact must be fallacious since it depends for its accuracy first upon the degree of observation actually made, and secondly, upon the degree of observation which is possible, and in any case must necessarily be mere opinion. It ignores functional depreciation which arises from the fact that property may be capable of performing the service it was designed for but is no longer economic in use. It makes no allowance for obsolescence as was demonstrated in the case of the Seaboard purifying unit.

These factors may necessitate the retirement of an article long before its original life expectancy and in such case a more rapid rate of depreciation would be required than was originally contemplated. Maintenance may arrest but it cannot completely halt depreciation and the rapidity of depreciation is directly related to the degree of maintenance which in its turn is related to efficiency of operation.

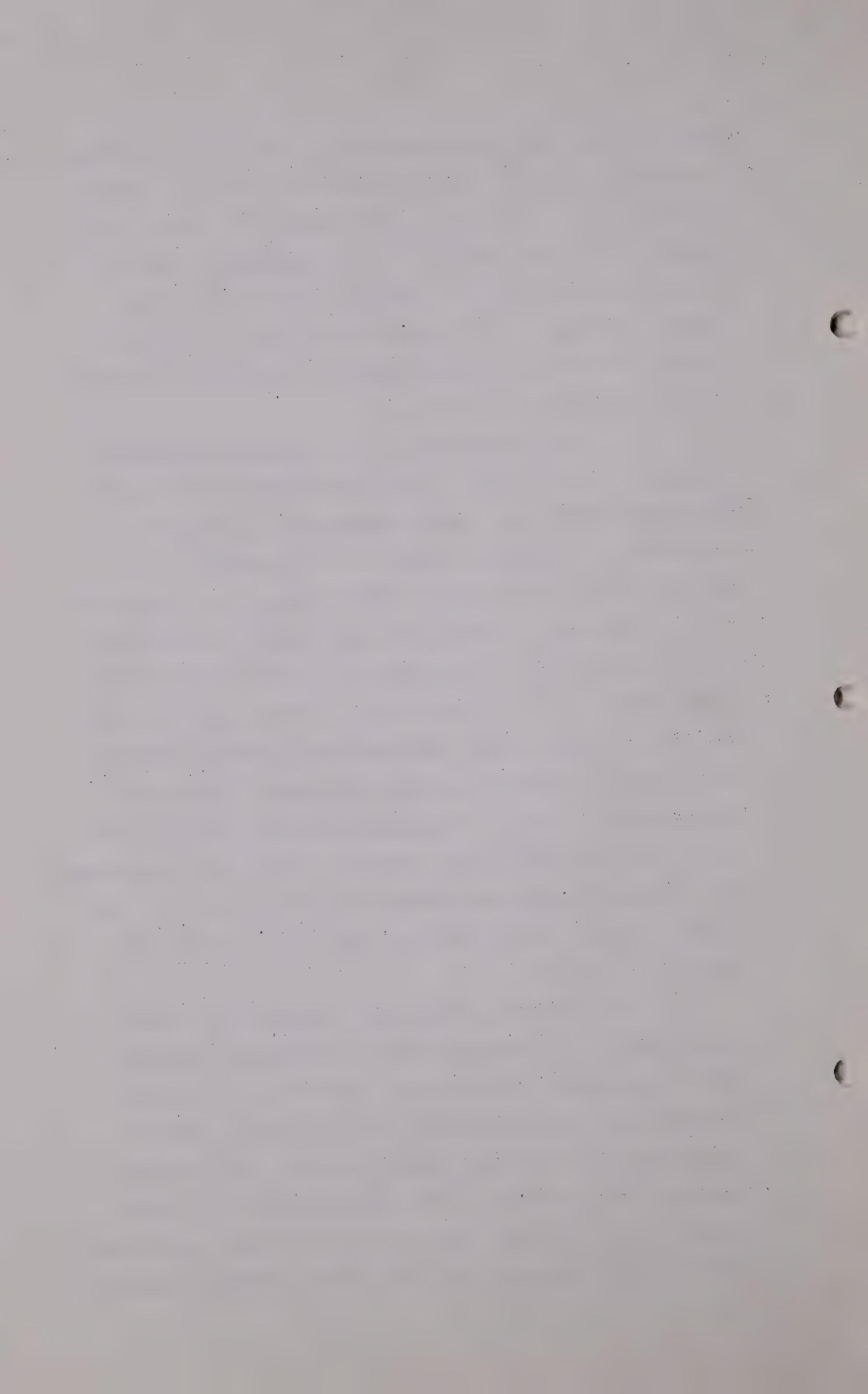
Straight line depreciation is generally favoured because of its simplicity and general accuracy, the percentage being related to life expectancy. If this method is applicable in the calculation of future depreciation, it should be equally fair in computing accrued depreciation.



In this case, where life expectancy of some of the assets included in the rate base is greater than the life of the operation, it would be wrong to penalize the utility by imposing upon it a straight line depreciation related to the life expectancy of the assets. On the other hand, some of the assets will be retired and must be replaced before the field is exhausted and in those cases, straight line depreciation should be used.

At the hearing there was a degree of unanimity regarding the propriety of using unit depreciation as the basis for calculating future depreciation applicable to those assets exclusively devoted to the service of a wasting asset - natural gas. That being so, the Board can see no impropriety in using the same method for computing accrued depreciation with respect to those assets. It is fair to the utility and above all it is not unfair to the ultimate consumer. Some discussion and argument arose as to the proper method of calculating accrued throughput depreciation. Wet gas is produced from the wells and the dry gas residue goes to the market. In the Board's opinion, unit accrued depreciation should be calculated on the same basis as future depreciation and that basis is outlined under that heading.

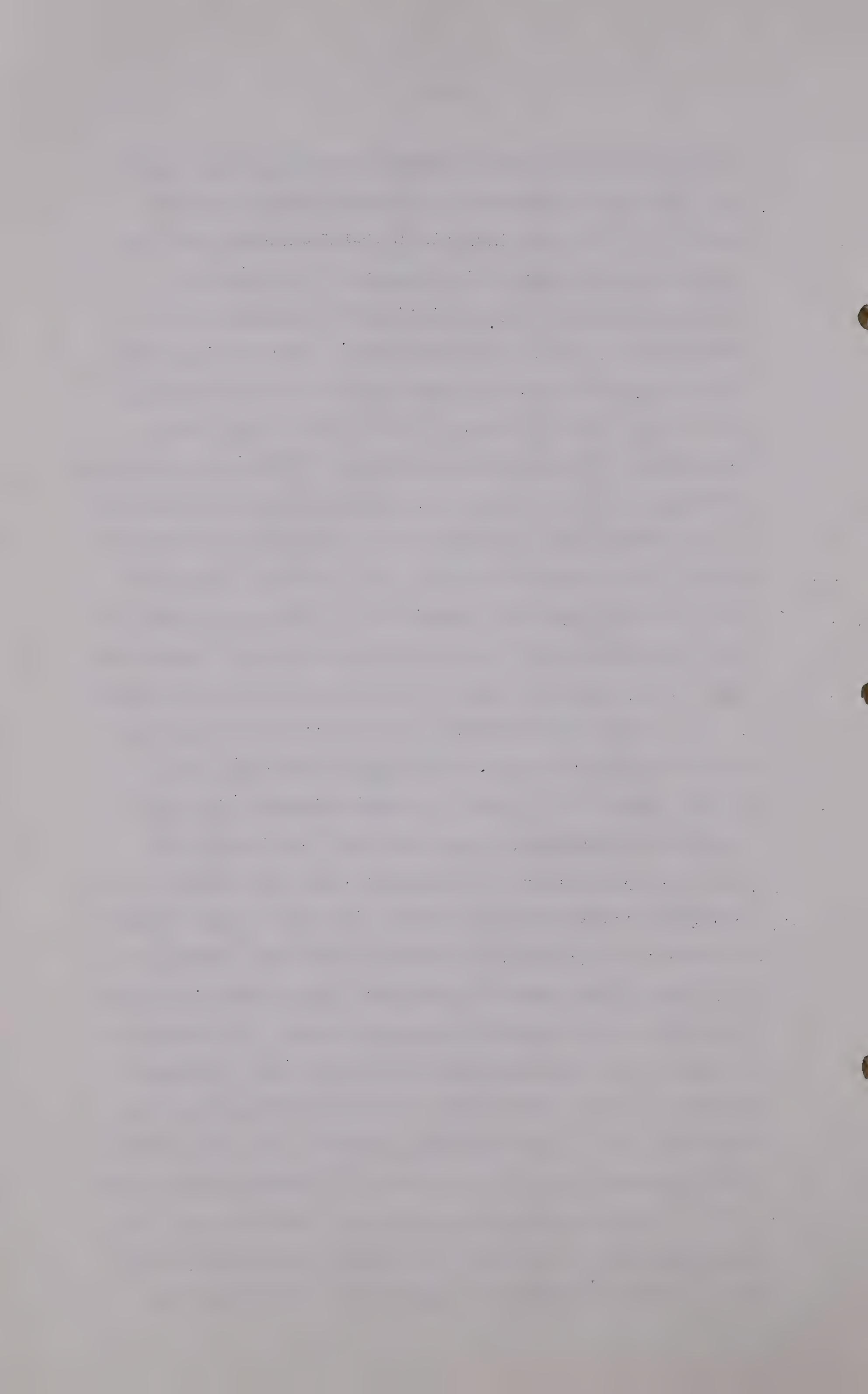
Madison's rate base will, therefore, be determined (except in a few minor cases of moveable property where reproduction cost has been allowed) on an original book cost or adjusted historic cost basis with accrued depreciation as indicated without salvage, plus an amount equal to five per cent of the resultant figure to arrive at fair value, nine per cent for overhead costs and working capital of \$190,000.00, plus the prepaid Girbotol royalty.



The Board feels that the question of salvage value might very well be reconsidered at a subsequent hearing when many of the subjects discussed in this decision will be reviewed in the light of experience. The figure for working capital is the one suggested by Madison and it is arrived at on a fair and usual basis. Mr. Hill suggested that \$150,000.00 might be sufficient if suitable billing arrangements could be made. To fix this latter amount would impose upon companies with which Madison does business and over which the Board has no jurisdiction the necessity of conducting their business to suit the Board's ideas respecting proper working capital. Mr. Hamilton suggested that borrowing could be resorted to. Both suggestions involve interference by the Board with managerial discretion and that is something which, in general, should be avoided.

The Board considered the propriety of applying original cost and book depreciation to gathering lines for the reason that these lines were primarily designed to serve the absorption plant and only incidentally to serve the gas market. For several years the volume of gas processed in the absorption plant exceeded by huge amounts the amount of gas going to market. The fact, however, is that these lines gather the amount of gas which is required for market when reduced to a residue basis. By orders of the Board, new gathering lines have been laid, designed primarily for the utilization of what otherwise would be waste gas, and it is, therefore, difficult to know on what basis these two sets of lines could be treated differently.

Lines added to the gathering system by order of the Board must of necessity be included in Madison's rate base and since Madison has acquired the old lines from

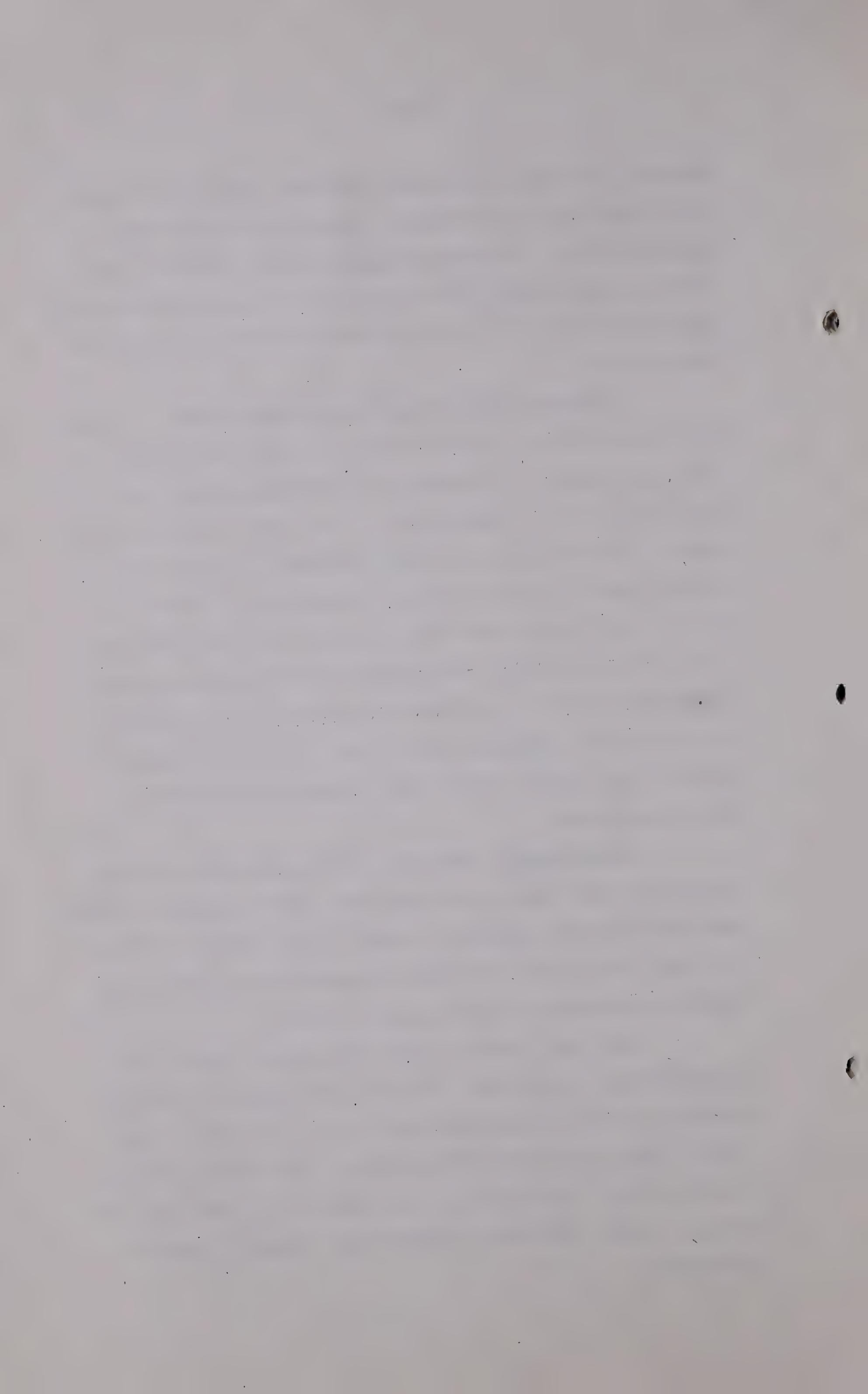


Royalite, the Board considers that they should be included in the rate base at original or adjusted historic cost depreciated on a wet gas throughput basis, and that the other considerations which attach to the dual service which gathering lines afford can best be adjusted in the allocation of costs.

During Mr. Hamilton's cross-examination, Counsel for Madison elicited the fact that a substantial number of items of equipment transferred to Madison appeared in Royalite's books at nominal value. In his discussion with company officials, when he was preparing his first submission, some of these items were considered and it also appeared that there were other items in the accounts which appeared to have been over-valued. Mr. Hamilton was under the impression that the officials agreed for the purpose of arriving at adjusted historic cost that the articles appearing at nominal value would offset those which had been over-valued.

Subsequently, when the hearing was well advanced, suggestions were made to Mr. Hamilton that certain additional amounts should be included as part of the historic cost of the items in question and these suggestions resulted in a further examination of the company's books.

One group valued by Mr. Hill at \$18,055.28 had a record value of \$49.00. It was later discovered that an error of \$10,240.58 had been made in the computation and that an amount of \$2,080.00 should be added in respect of certain meters which had not been included in this list of assets. These adjustments result in a revised figure of \$9,894.70.



Mr. Hamilton concedes that some adjustment might be made in respect of these items and the Board, therefore, has allowed in the rate base:

- (1) Items at reproduction value less observed depreciation, plus nine per cent, plus five per cent, in respect of items in Group 1 valued at \$475.00.
- (2) Items at cost value less throughput depreciation plus nine per cent plus five per cent, in respect of Items in Group 1 valued at \$2,036.03.
- (3) Items at computed cost taken at seventy-five per cent plus nine per cent, plus five per cent, in respect of items in Group 1 valued at \$7,383.67.

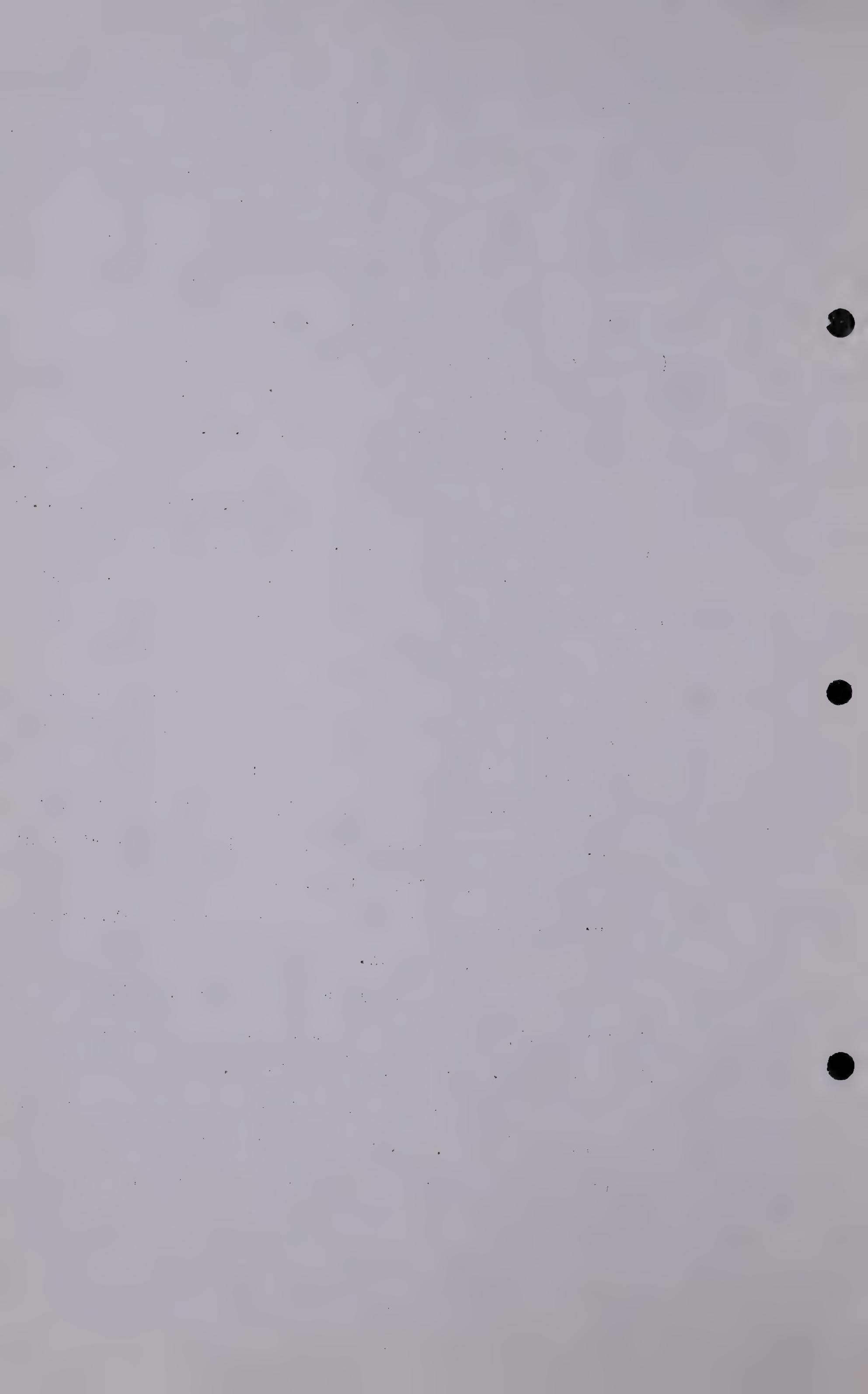
The resultant figure allowed in the rate base is \$8,741.14.

The second group valued by Mr. Hill at \$78,075.16 had a book value of \$7,385.88. Madison was unable to produce any evidence whatever to establish when or where the money representing the items in this group had been expended and it is reasonable to suppose that items of such magnitude must appear some place in the books. Mr. Hamilton suggested that these items, although taken over by Madison from Royalite might be accounted for:-

1. By having been charged by Royalite to expense; or
2. Might have been capitalized in the historic cost of the Royalite plant; or
3. Might be included in the cost of the plant now owned by Madison.

In the case of Alternative 1 or 2, adjustment might properly be made but no adjustment can be made if Alternative No. 3 could be established.

In this group, Mr. Hamilton has already allowed the book cost of \$7,434.88 in his historic cost calculations and no further allowance can be made. If



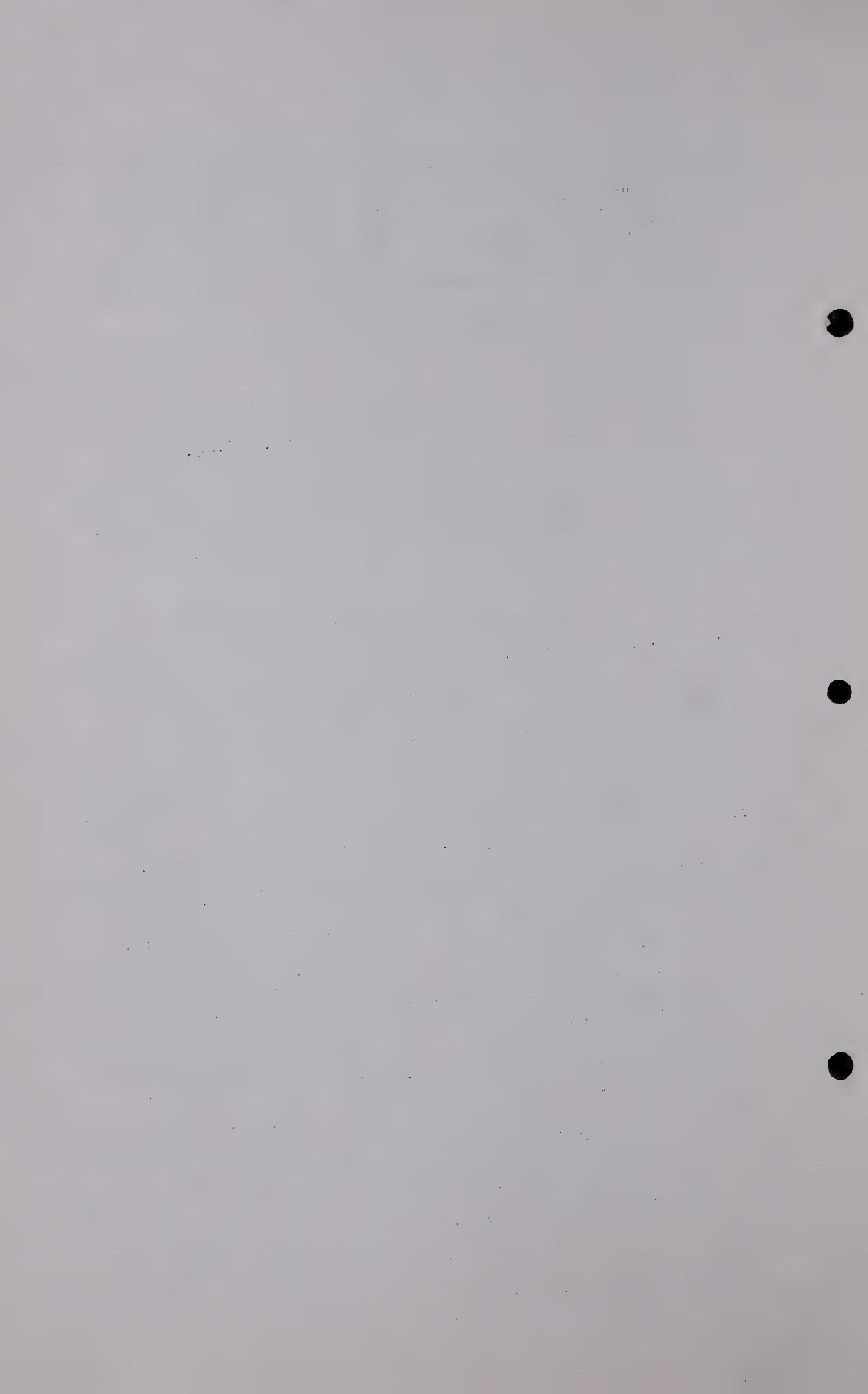
Madison can show by relevant entries in Royalite's books that part or all of the difference can be accounted for - that is, if it can be shown where and how the money was prudently invested in assets used by and useful to Madison - an adjustment can be made at a later date.

The third group consists of items incurred during experimentation with and alterations made in the Girbotol purifying plant. The total amount is \$52,958.55, of which \$32,319.35 represents the cost of contaminated chemical used in the Girbotol process. This chemical was not taken over by Madison and is still carried in Royalite's inventory.

In his evidence given earlier in the hearing, Mr. W. C. Kirkpatrick, an official of Madison, stated that this chemical (still in Royalite's possession) was not originally acquired by Madison, and is still owned by Royalite. Apart from that, however, it is neither used by Madison nor is it useful to it. The total expenditures in this connection were \$72,064.57 of which amount \$20,000.00 was capitalized and has already been allowed by Mr. Hamilton in his historic cost. The balance was charged to expense.

With respect to this group, no allowance can be made. Obviously the contaminated chemical forms no part of Madison's assets nor is it used or useful. The balance of experimental costs is amply taken care of by the value which has been placed upon the whole of the plant.

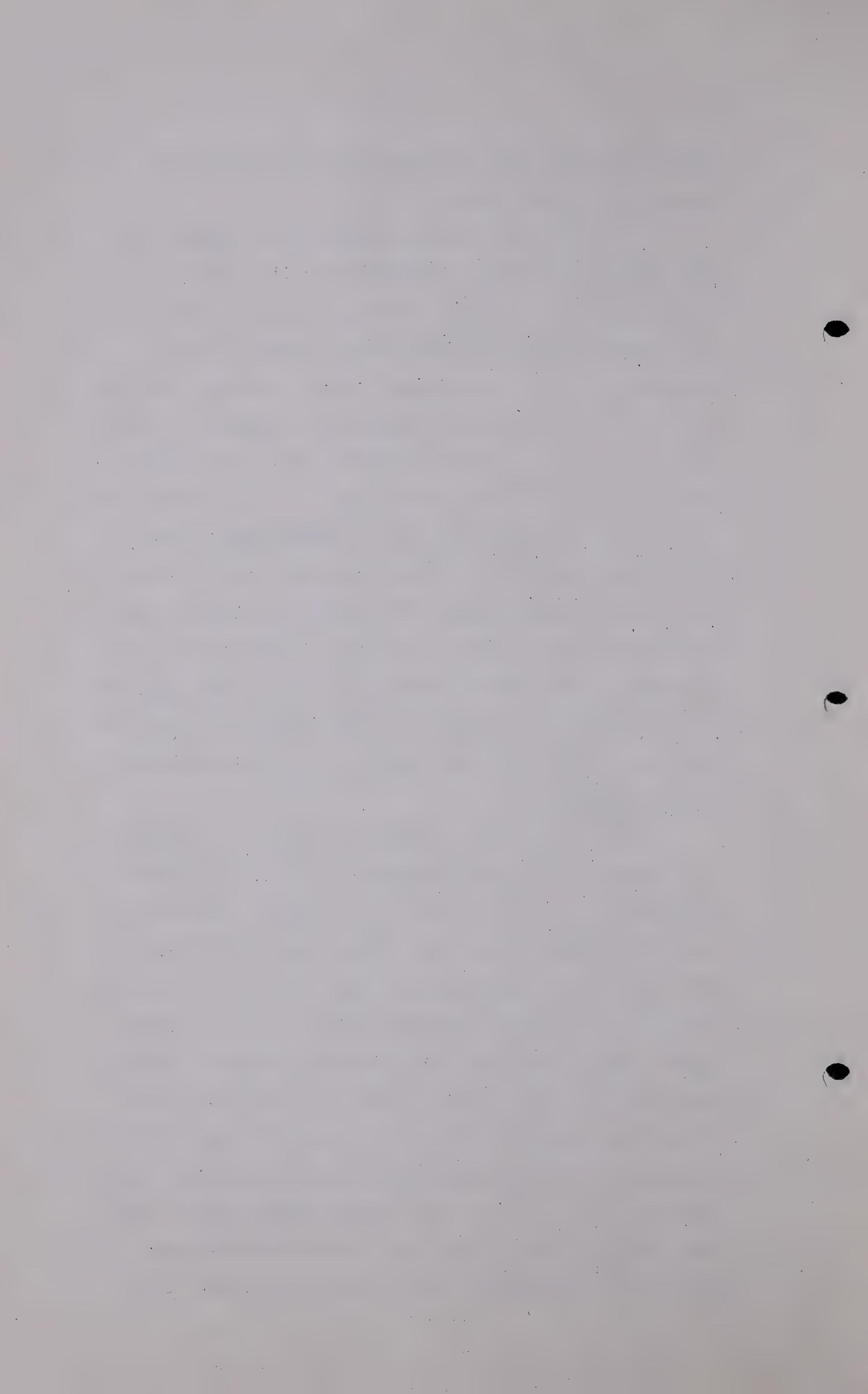
The items in Group 4 arise out of certain plant consolidation undertaken by Royalite in 1943-1944. The expenditure involved was \$639,582.02. Certain of the items included in this amount were transferred to Madison and were capitalized by Royalite at \$283,700.00. Royalite



wrote off \$68,682.00 to expense and capitalized the balance in its own books.

Madison now seeks to increase the amount of \$283,700.00 by the sum of \$23,294.07. To offset all of these groups, Mr. Hamilton felt that there was over-valuation of assets included in his historic cost summation and quoted an example where, although the historic cost of an item was \$10,000.00, reproduction cost now according to Mr. Hill was \$3,700.00. Consistently with his theory, Mr. Hamilton allowed the full amount of \$10,000.00. The historic cost of assets transferred to Madison and constructed during the consolidation operations is much greater than the reproduction cost as determined by Mr. Hill. Other such items were mentioned but the above illustrates the point made by Mr. Hamilton and the principle upon which he reached his conclusions that there was an offset to the items in the first, second and third groups.

Items in Group 4 will be disallowed. Royalite and Madison agreed that Madison's capital share of the assets which came into being as the result of the consolidation of the Nos. 1 and 2 Absorption Plants, was \$283,700.00 as at 1st January, 1944. In 1946 - for some reason not explained - Royalite seeks to increase the capital amount chargeable to Madison arising out of the consolidation arrangement. There is no evidence that Madison was consulted nor is there any evidence as to the basis upon which this additional charge was made. It is agreed that the item of \$283,700.00 reflects more than even abnormal costs - for which neither Royalite nor Madison is responsible - and certainly does not exceed



the reproduction cost new valuation of the assets in question as determined by Mr. Hill.

That being so, it is not unfair to Madison to hold that the value agreed upon between it and Royalite as representing historic cost should be binding upon it.

Madison's rate base as determined by the Board at the sum of \$1,918,956.89 is set out in Schedule 1 attached. Supporting schedules have been added for the convenience of the company and the Board's Auditors.

#### GAS AND OIL REFINERIES LIMITED

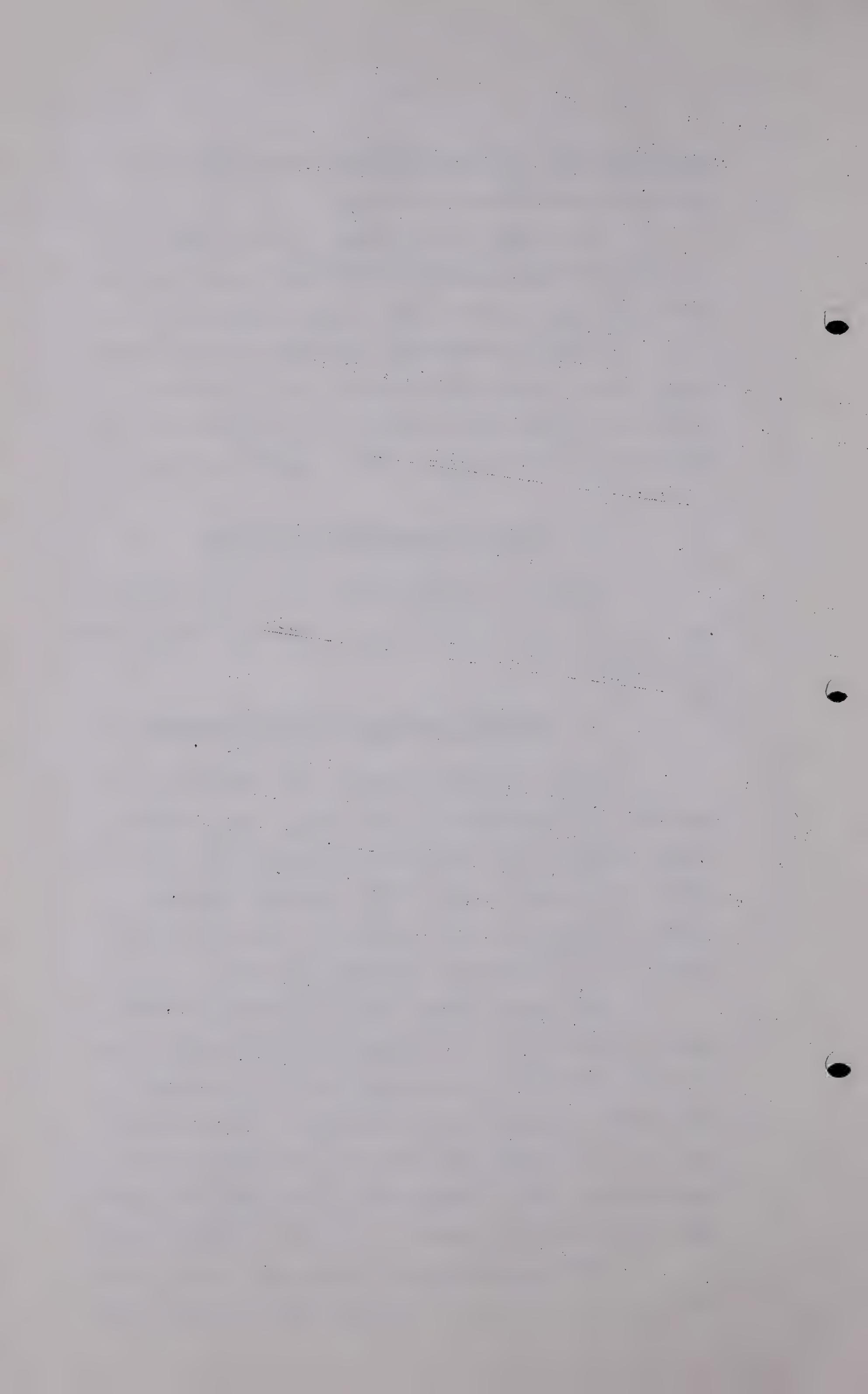
Different considerations apply to this company and it is discussed and dealt with under the caption "Cost Allocation".

#### BRITISH AMERICAN UTILITIES RATE BASE

As in the case of Madison, the Company's rate base will be composed of gas gathering lines and water lines owned by B. A. prior to the incorporation of B. A. Utilities, together with the new equipment and new gathering lines which the latter installed, but subject always to the adjustment hereinafter mentioned.

Mr. Kenneth Robert Teis, a petroleum engineer, made a valuation of the old high pressure gathering lines which are carried in the company's books at the sum of \$27,037.86. He made his valuation as of 22nd November, 1944, and it covered pipe lines, valves, meters, drips and appurtenances used in transporting high pressure natural gas from producing wells to the gasoline absorption plant.

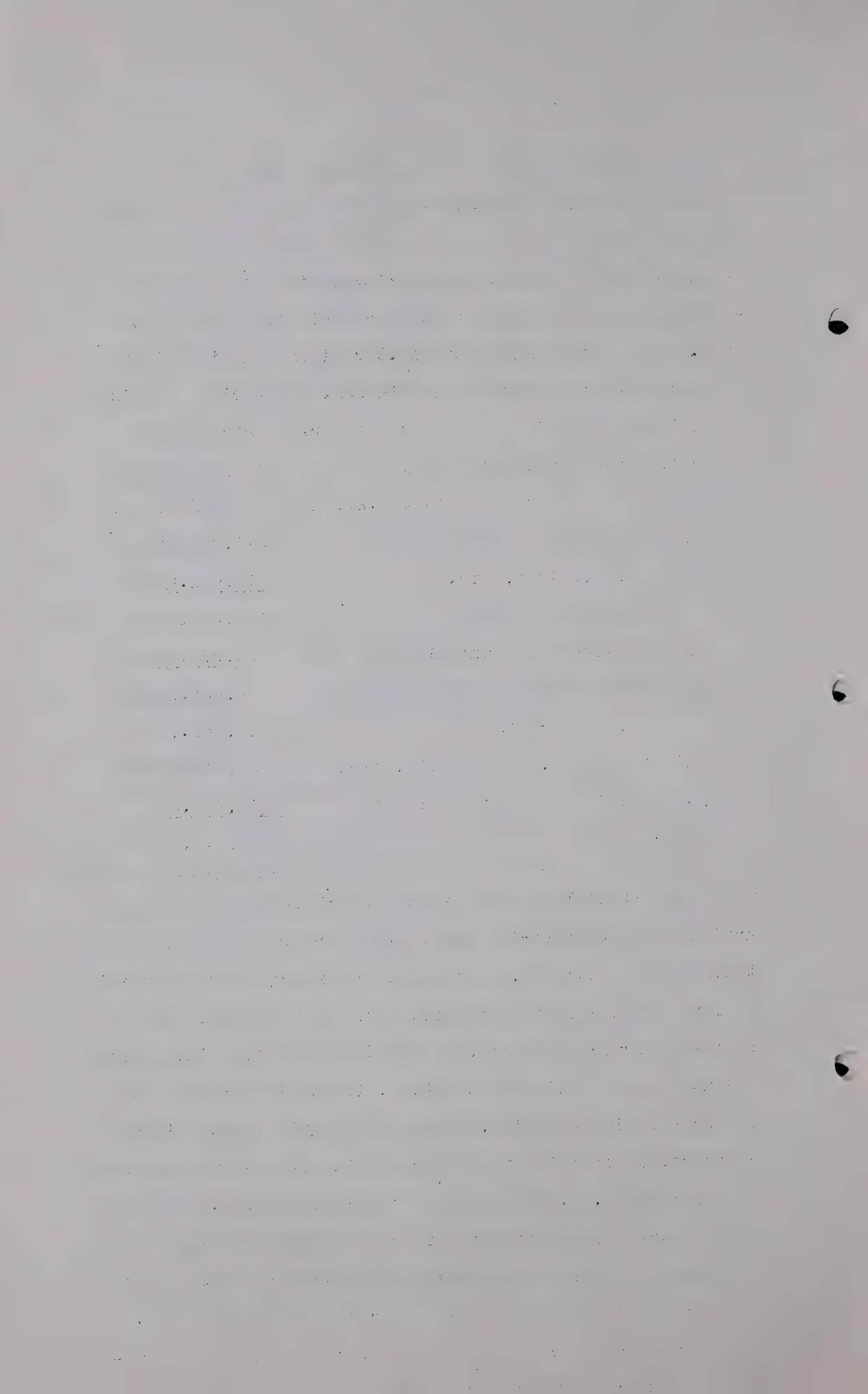
The first sections of these lines were laid in 1936 and in the interval additions and changes have been



made. He stated that the gathering system did not represent the most economic type of conduit at the present time. The system extends to 12.089 miles and pipe sizes vary from two inches to twelve inches. He arrived at his valuation by applying present day material prices and abnormal labour costs to the system and thereby arrived at a replacement cost of \$154,545.27, made up as follows:

Pipe	\$71,990.74
Valves, fittings, etc.	<u>29,602.28</u>
	\$101,593.02
Less Observed Depreciation	<u>30,990.44</u>
	\$ 70,602.58
Installation costs	65,686.93
Rights of way, legal costs, etc.	4,215.26
Supervision and administration	<u>14,040.50</u>
	\$154,545.27

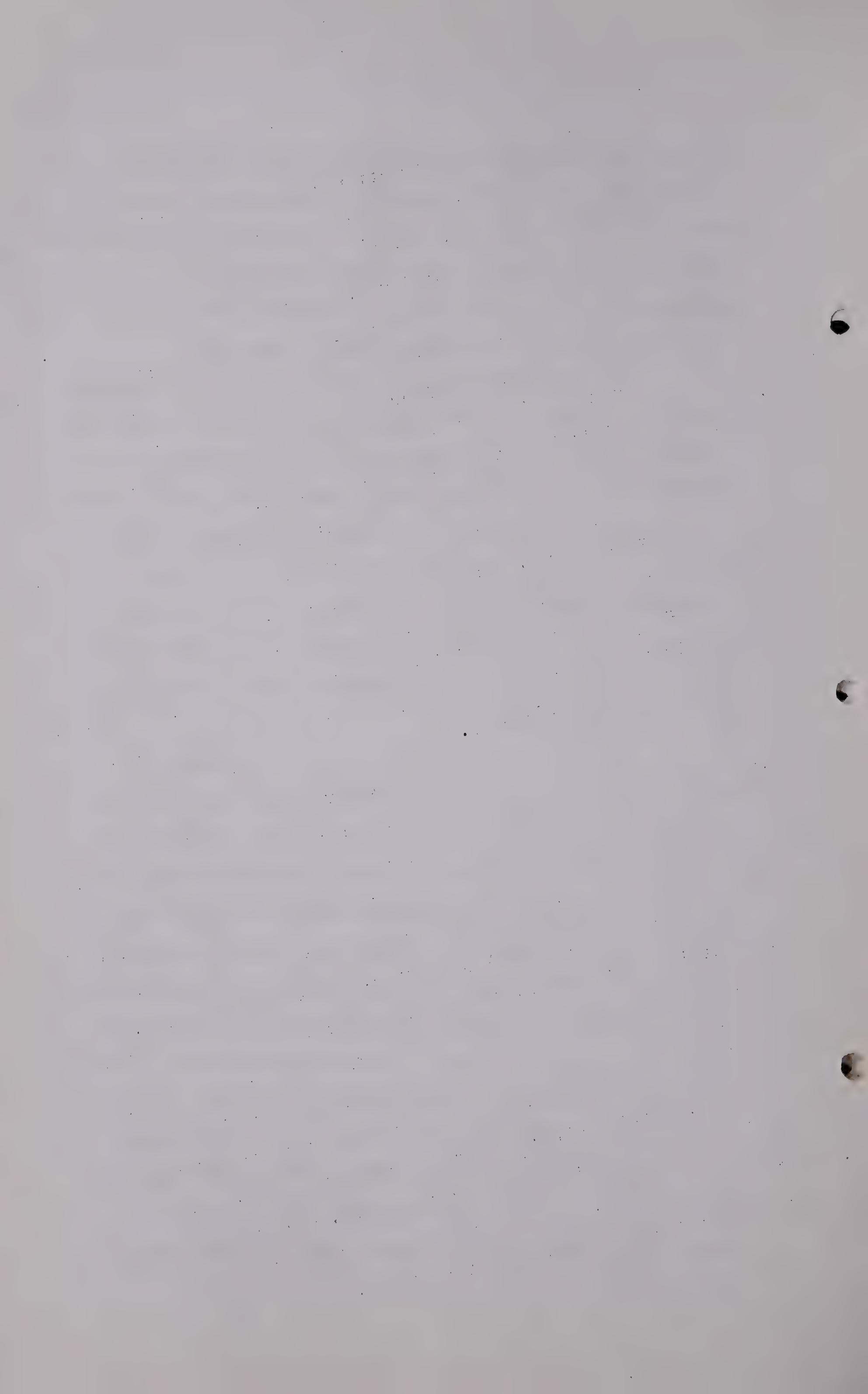
It will be noted that depreciation has been applied only to material and that no account has been taken of the adequacy, efficiency or economy of the general design of the gathering system. The witness considered that the service life of the pipe in the system will extend beyond the field life in the B. A. Area. In arriving at the cost of installation, he used unit prices found in a contract, under which the Gentry Engineering Company laid pipe for the B. A. Utilities in the Fall of 1944. That was a special contract authorized by the Board because of the need for haste and because of the urgency of the then situation and it is conceded that costs were quite high. Those unit prices cannot have any place in making a valuation of a normal undertaking and in normal times and even



if the reconstruction cost new theory is admitted as being sound, the Gentry prices would not afford a safe or a reasonable basis upon which to construct a rate base for plant and equipment constructed many years ago. In addition the witness applied his depreciation factor to material only which is surely a unique principle.

No consideration was given by him to the original cost of the system and he stated that he did not think that original cost should be considered. His opinion was that present value as he arrived at it was the only proper basis of valuation and he was not concerned if original cost was greater or less than immediate cost. He gave no consideration to the fact that the system was designed or rather grew up to fill the needs of the B. A. Absorption Plant rather than a system designed to furnish natural gas to ... consumer market.

He did not attempt to evaluate the service rendered by the system to the absorption plant or to the service given to the new natural gas utility company. He made no study of comparative prices of material from 1936 to 1944 and he totally disregarded salvage value and was unable to give any salvage factor. He agreed, however, that if he had ascertained through inspection that the life of the pipe was ninety-five or eighty-five per cent gone, he would have been obliged to make adjustments with respect to the cost of labour. It was pointed out to the witness that Mr. Hill's unit cost for 6-inch pipe was 48.4 cents per foot as against his unit costs of 95.46 cents per foot for the same pipe, and that the former figure included items not included in the latter figure. He was unable to

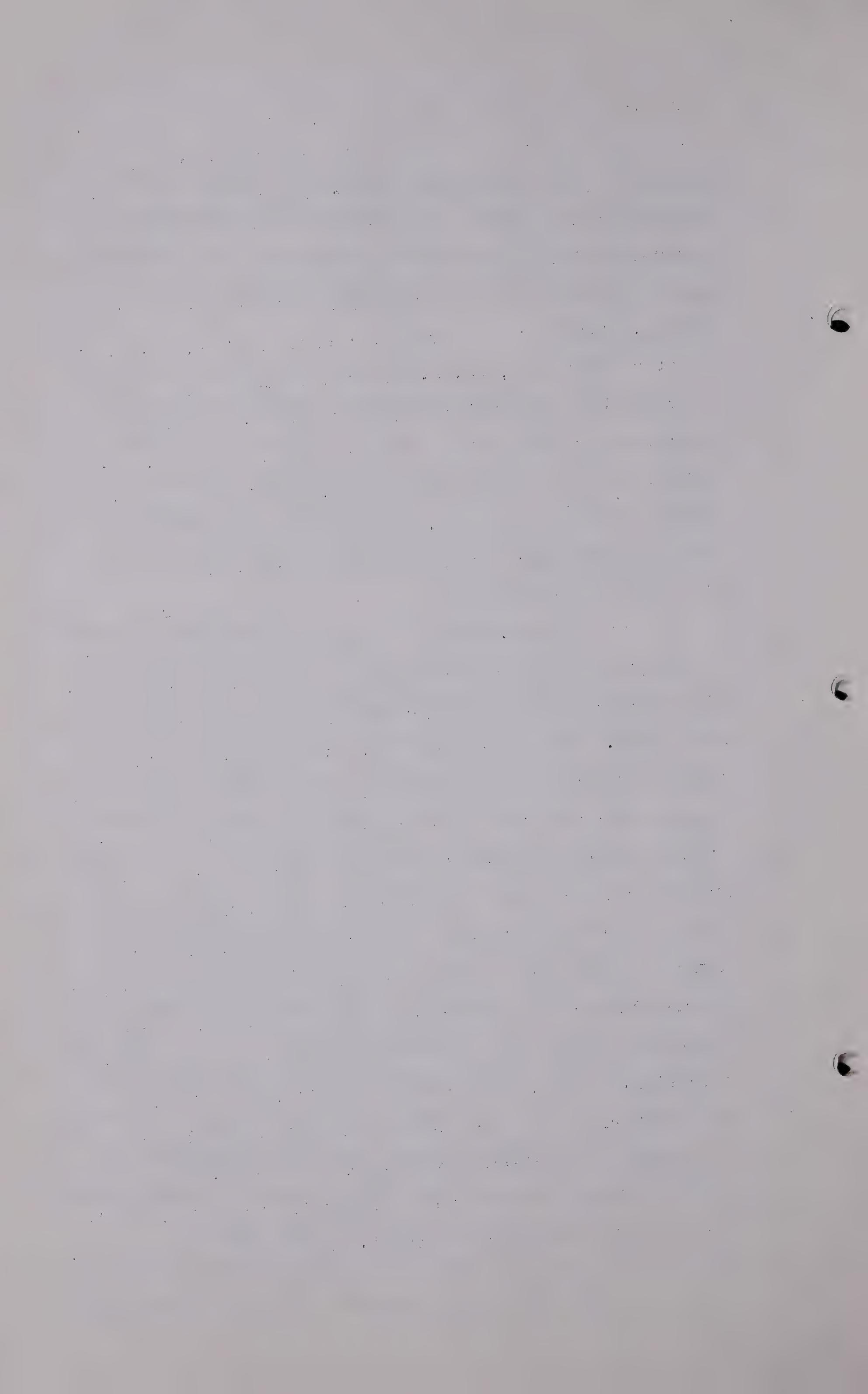


explain the very substantial difference between the two. His ten per cent factor for administration costs was a figure suggested to him by his principals. The valuation made by this witness hardly affords the Board with a starting point.

The water system was valued by company officials at \$36,872.54 less observed depreciation of \$6,822.31, or a net value of \$30,050.23. As in the case of gas lines, depreciation was applied only to material. The total value placed upon the gas lines and water lines was \$184,595.00, although this amount was subsequently varied and reduced by a few thousand dollars.

The Board agrees that book depreciation is merely an accounting concept and may not be useful in arriving at a standard of value. In this case all of these lines had been depreciated at an accelerated rate because it was considered that the whole undertaking would have a relatively short life. The lines have a service life greatly in excess of the life of the south end of the field and at the moment no salvage value will be considered. Salvage value, however, may become important and can be reconsidered by the Board when the whole situation is reviewed after 1948. While different considerations apply to British American from those applicable to Madison, it seems to the Board that the rate base should be determined on the same basis as that of Madison and that any difference can be adjusted in cost allocation. The gas and water lines will, therefore, be valued for rate base purposes on the basis of historic cost less accrued depreciation with no salvage value.

The question of new construction presents features which call for preliminary comment. When the hearing opened,



Counsel, in advocating the adoption of the B. A. scheme, stated:

"It contemplates a very effective scheme for the conservation of gas ..... and as far as the economics is concerned it can do it well within the price being paid by the gas company at the scrubbing plant."

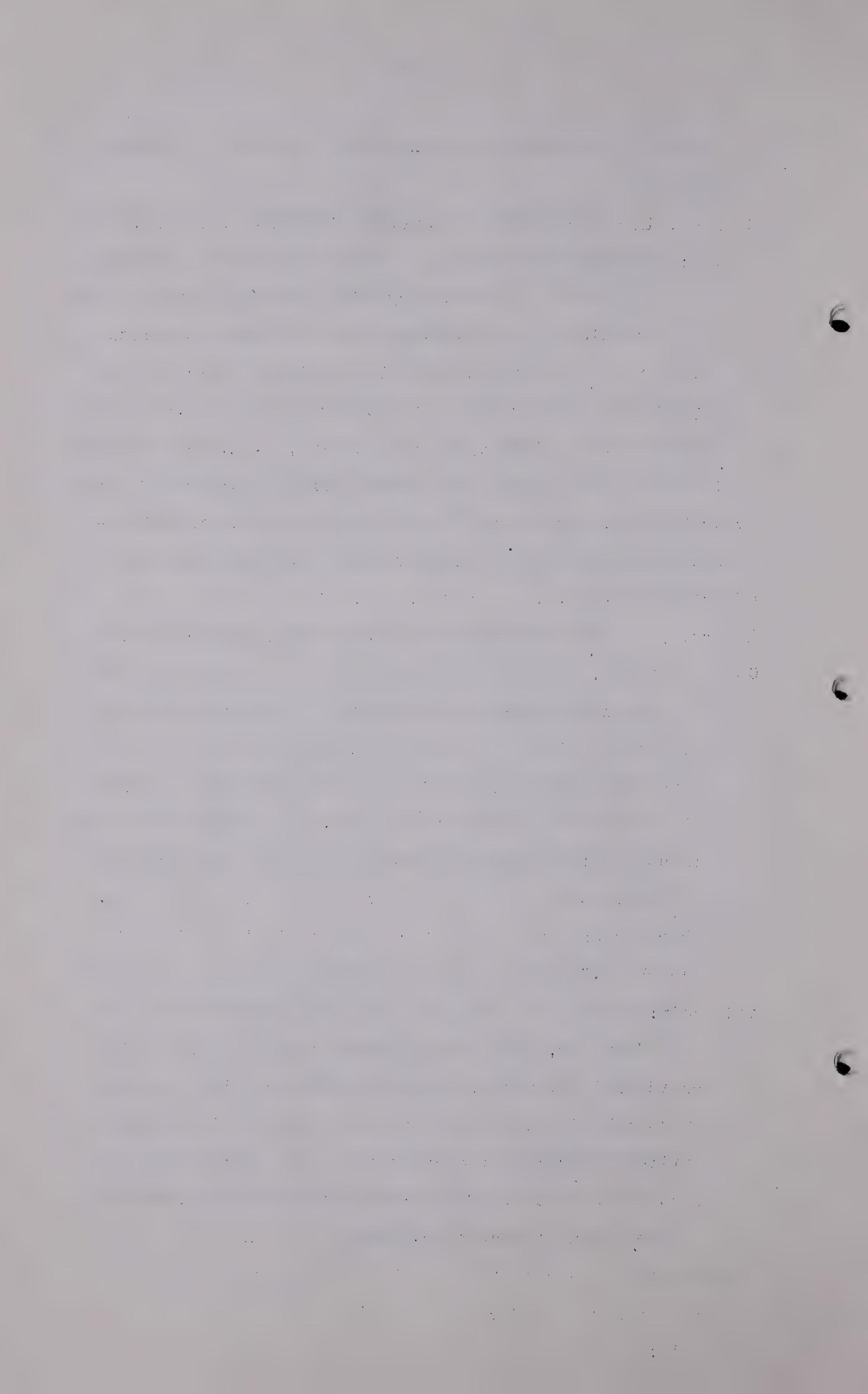
On the third day of the hearing, B. A. made an application asking that, either an interim order or a final order be made, giving them the right to go ahead immediately with their scheme, and alleging that it would not unduly affect any person, that it would not affect any person adversely and would benefit others. On that application, Counsel stated:

"Now the starting point of the present rate so far as the field is concerned is 7 3/4 cents at the down stream side of the Royalite scrubbing plant for clean gas sold to the gas company. Now if that rate is not disturbed we feel that our position is sound and that we could go ahead with our entire submission. There is one unknown factor and that is the price of scrubbing."

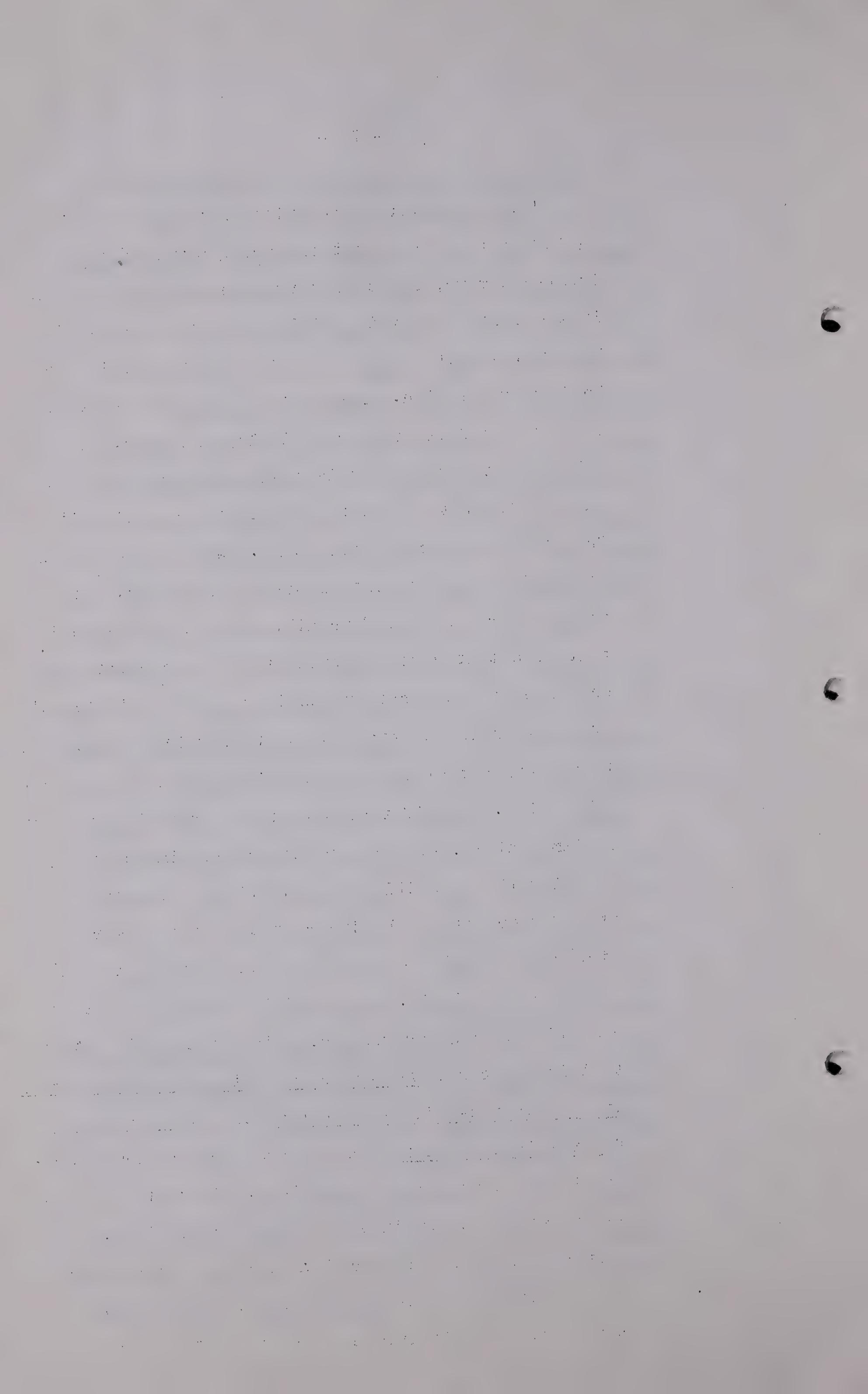
and again:

"However, we have confidence that the price this Board will set will be a fair one for scrubbing and on that basis we are prepared to go ahead with our entire submission at once on the basis that we will accept 7 3/4 cents for our gas on the down stream side of Royalite scrubber. We will pay Royalite or the then owner of the scrubbing plant the cost that this Board sets for scrubbing."

and again:



"My alternative suggestion is this and we feel satisfied that the first and prior move, most important move, is to conserve the low pressure gas in the south end of the field. Now to conserve it I do not use it in the terms that were used in the Madison submission. I use it on the basis that it is being usefully and economically employed. And I submit at the moment it is being usefully employed in particular to raise the oil that comes with it from the low pressure oil wells. And then as it is popped it is of no further use to any of us. At the moment there is some four million feet available in that area that could be brought into our plant and processed for absorption gasoline with the installation of a low pressure gathering system, which is the same installation that is suggested in our original overall submission. Now if that were to be installed and put in immediately, or were proceeded with immediately, we think that possibly the situation would develop itself where it may be incorporated in the overall picture that this Board finally directs shall take place in that field. We think it is a move that is essential in any scheme and, being so satisfied that that is the case, we are prepared to go ahead entirely at our own risk with the preliminary steps required for the installation of a low pressure gathering system in the south end of the field. By that I mean we anticipate that within a reasonably short time, a matter of weeks, this Board will come to some final order after these hearings. We anticipate that this can be made to fit into any scheme of the Board and



in that case we will be looked after. If our anticipation is incorrect and does not fit into the picture, we are prepared to go ahead but that is our entire responsibility, our entire loss, the action of the Board will be entirely unprejudiced in respect to the final order."

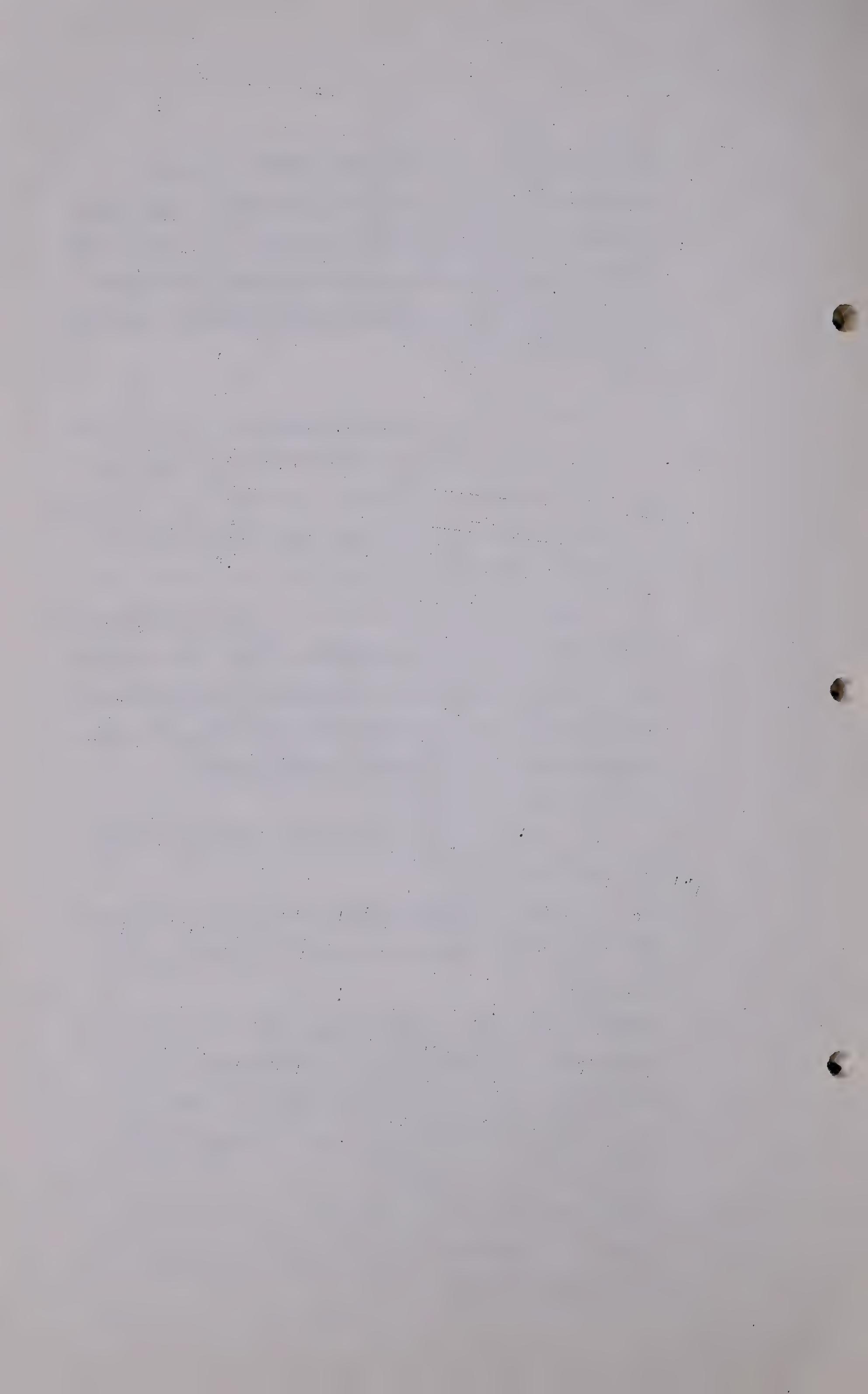
and again:

"We do not wish it to be suggested that we have done anything in defiance of the Order or anything that will embarrass the Board nor by taking the chance of going ahead and having some other Board say not having the permission of this Board they won't give us the right to build pipe lines. So that it is really a negative order we ask from this Board, that is that they have no objection to us going ahead provided it is without the prejudice to any order they may ultimately give and entirely at our own risk."

The underlining is the Board's.

The entire scheme submitted by British American Oil was that they would:-

- (a) Install a booster station and low pressure gathering line to pick up essentially all low pressure gas in Township 18.
- (b) Install and operate a compressor station capable of compressing all residue gas to sufficient pressure for delivery to the scrubbing plant at a pressure of 325 pounds or to inject into the formation all gas not needed for the market.
- (c) Install and operate a residue gas pipe line for delivery of gas from the British American plant to the scrubbing plant.



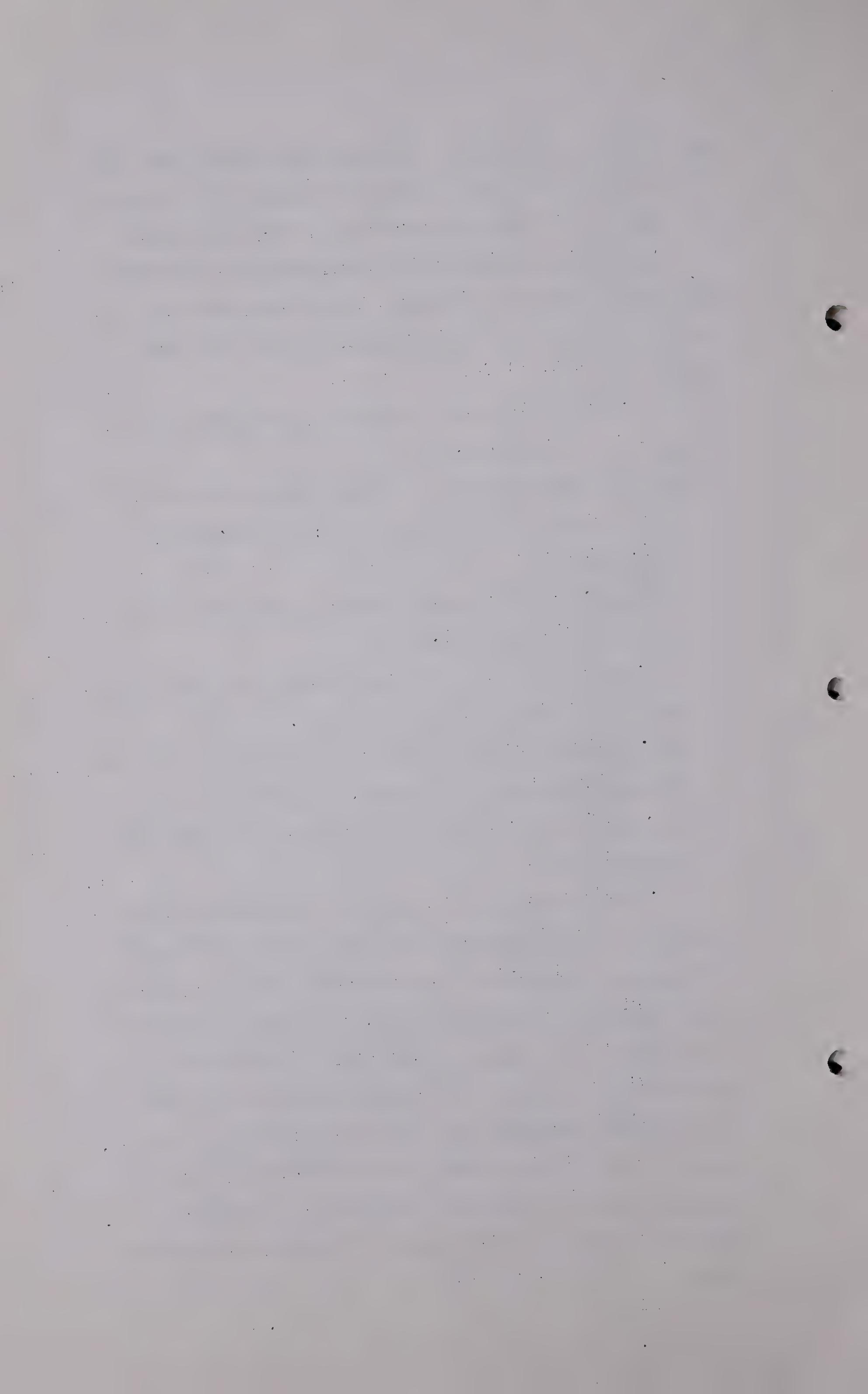
(d) Install and operate a high pressure residue gas line to sufficient input wells in Township 18 so that all gas not sold could be returned to the reservoir.

The estimated cost of the foregoing programme was \$480,681.00, the estimates having been prepared by Mr. J. A. McCutchin, a Petroleum Engineer and Production Manager for B. A.

It was alleged that these installations would produce the following results:

1. Gas not required for the market being returned to the formation where it would be used to produce additional oil.
2. Producers in the British American area would find a market for all gas produced.
3. Producers would have the use of stored gas for bringing oil to their wells.
4. If producers required high pressure gas for gas lift this service could be given at reasonable cost.
5. All portions of the field would have a comparable economic life.

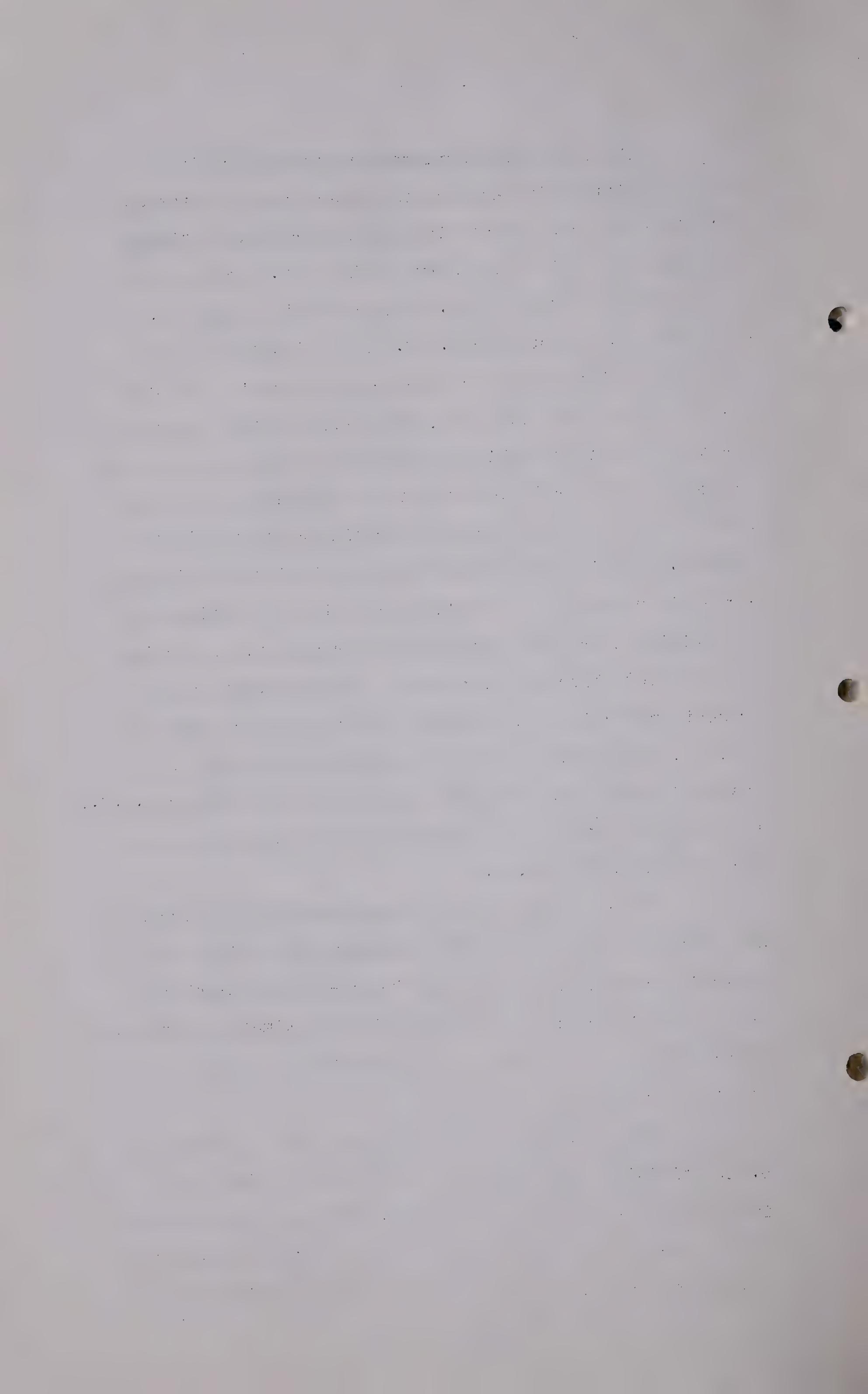
In evidence, Mr. McCutchin submitted that by picking up low pressure gas, the absorption plant would have greater production, that its life would be extended by at least two and one-half times and that all gas would be utilized, none flared or blown to the atmosphere. He estimated that with the low pressure system in operation, the available reserves recovered would amount to 42.69 billion cubic feet, whereas if the low pressure gas were not picked up, the reserves available to the British American absorption plant would be 17.65 billion cubic feet.



In an Exhibit supplementary to the original scheme submitted, it was made to appear that the average overall cost for both the high and low pressure systems to handle the whole gas reserve would be 2.60 cents for the compressor station and .81 cents for the gas line, or a total of 3.41 cents per M.c.f. This figure does not include scrubbing costs or a well-head price to the producers. This price did not include any capital allowance for the old gathering lines which the witness at that time assumed would operate to serve the absorption plant and that the plant would bear all operating costs relative thereto. He did not propose that they be included in the company's rate base. He estimated that the adoption of the British American scheme would increase oil production by about 2600 barrels per month. He stated that under present production methods and without a low pressure system, the available gas would be exhausted in three and one-half years and, assuming a price of two cents per M.c.f., the present worth of the income from the sale of residue gas would be \$576,234.00.

He considered that his estimates were as accurate as possible and that with the exception of possible adjustments in amortization there was "no so-called slack" in any of his figures; he had compared his estimated operating costs with those of Madison and found them to work out within four places of decimals.

His estimates were predicated upon a profit to B. A. Utilities consisting of the rate of return, on an investment retired over five years, and the benefits which would accrue to the absorption plant. In that latter connection it may be well to refer to another statement made



by Counsel:

"Casing head natural gasoline is vitally needed by refineries."

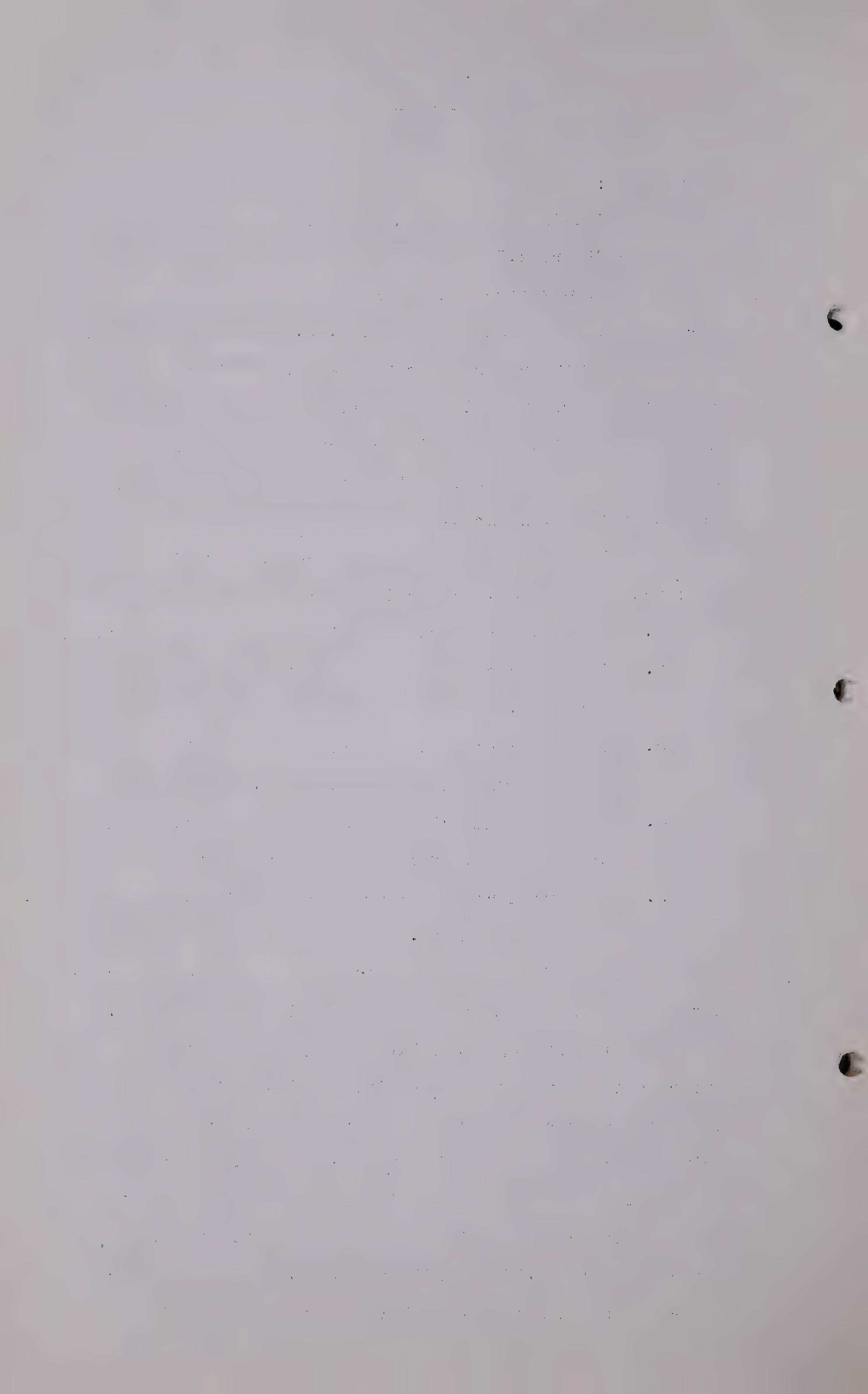
It was stressed on cross-examination by Counsel for producers, who supported the B. A. Utilities' scheme, that if gas not required for the market should be stored in another portion of the Field (as contemplated by the Madison scheme) that the oil production in the British American area would be less than if the surplus gas were stored in the B. A. Area.

The benefits which would accrue to various parties according to Mr. McCutchin were:

1. To producers because of increased oil production.
2. To producers because of greater natural gasoline recovery.
3. To producers because a market for residue gas had been made available to them.
4. To British American Oil Company because of the extended life of the absorption plant.
5. To consumers in Calgary because of the extended life of the field.

Then followed the statement that the retail consumer market should pay all of the costs of the scheme.

In effect, Mr. McCutchin says the ultimate consumer must pay the whole cost irrespective of the benefits which would accrue to others. Perhaps that may be a general principle in unregulated business - the Board does not pretend to know and has no evidence on the point - but it does not accord with what the Board conceives to be just and reasonable public utility practice. The Board considers that costs should be borne by all who benefit by



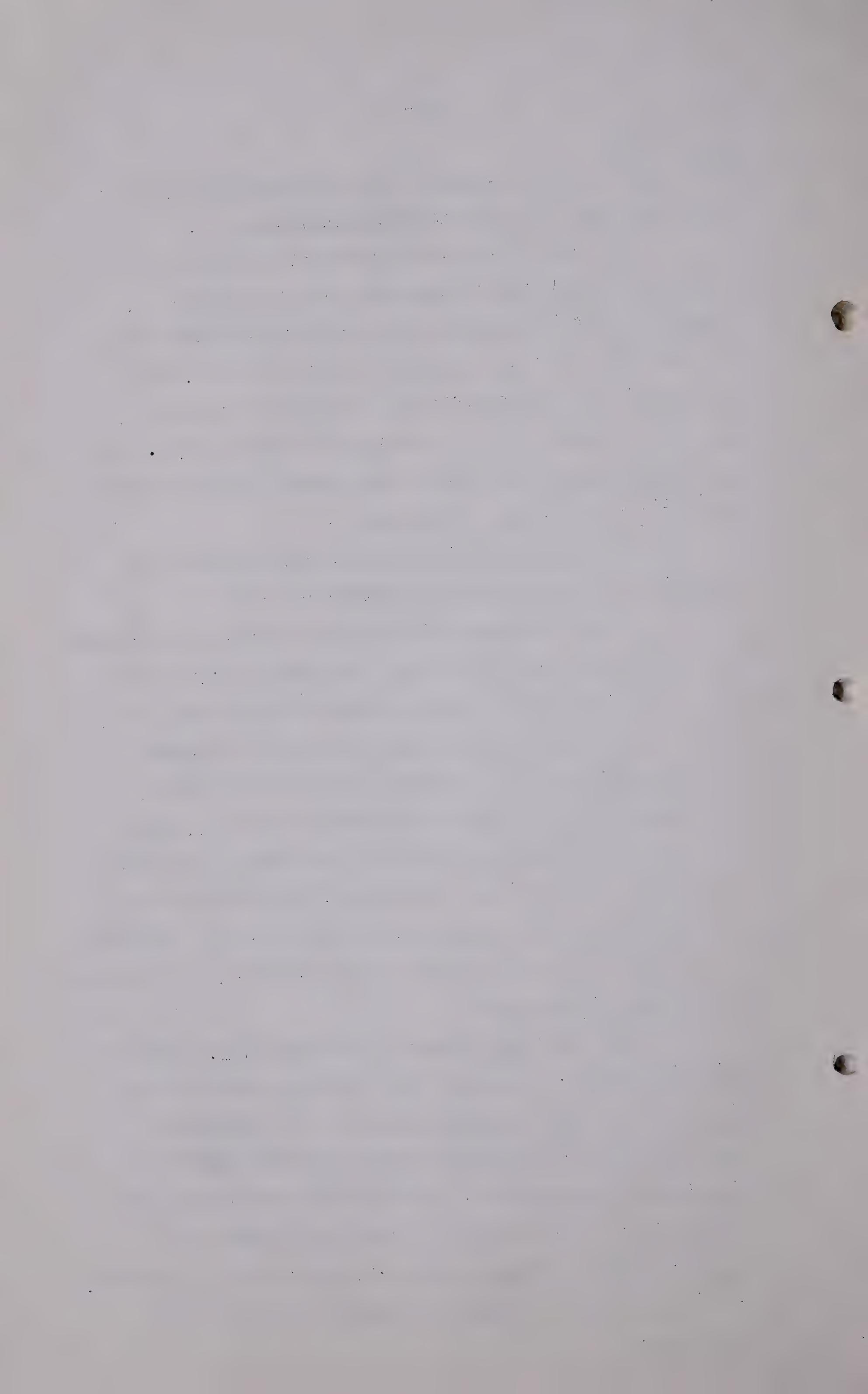
use of the installed facilities and particularly so in this case where so many considerations apply.

It should further be mentioned that when Madison's alternative schemes were being submitted, Counsel for the producers directed his cross-examination to establish that low pressure wells in the B. A. area would receive no benefit if one of Madison's schemes should be adopted in its entirety by the Board, but that they would receive benefits if the British American scheme in its entirety should be adopted.

In argument following upon this phase of the hearing, Counsel for British American stated:

"That the plan is a sound one from an engineering standpoint, that it is fair and beneficial to the owners of both oil and gas wells in that area, that it is an economical one and through its economic operation the life of that field will be greatly extended, resulting in the recovery of oil, naphtha and absorption gasoline that could not be recovered under any other plan submitted. All these products are at all times most vitally needed by the different refineries and by gasoline manufacturers, and of other petroleum products."

An order was issued authorizing B. A. to proceed with its scheme. In making that Order the Board had in mind capital cost estimates submitted, the estimated operating costs, the various representations made by the company and by producers, the benefits which it was said would accrue to all affected parties and lastly, the urgent, if not the importunate solicitation of the company. As will be seen, the estimates turned out to be quite erroneous.



British American now asks for a rate base including working capital of \$972,832.40, as follows:

Low pressure gathering and discharge

lines to field compressor station \$143,129.59

Low pressure gas field

compressor station 159,575.49

High pressure line from absorption

plant to Royalite's scrubbing

plant 239,999.01

High pressure station and

repressure system 243,733.30

Automotive equipment 4,134.38

Office equipment 776.87

Water system 27,473.37

Existing high pressure gas

gathering lines 154,010.39

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\$972,832.40

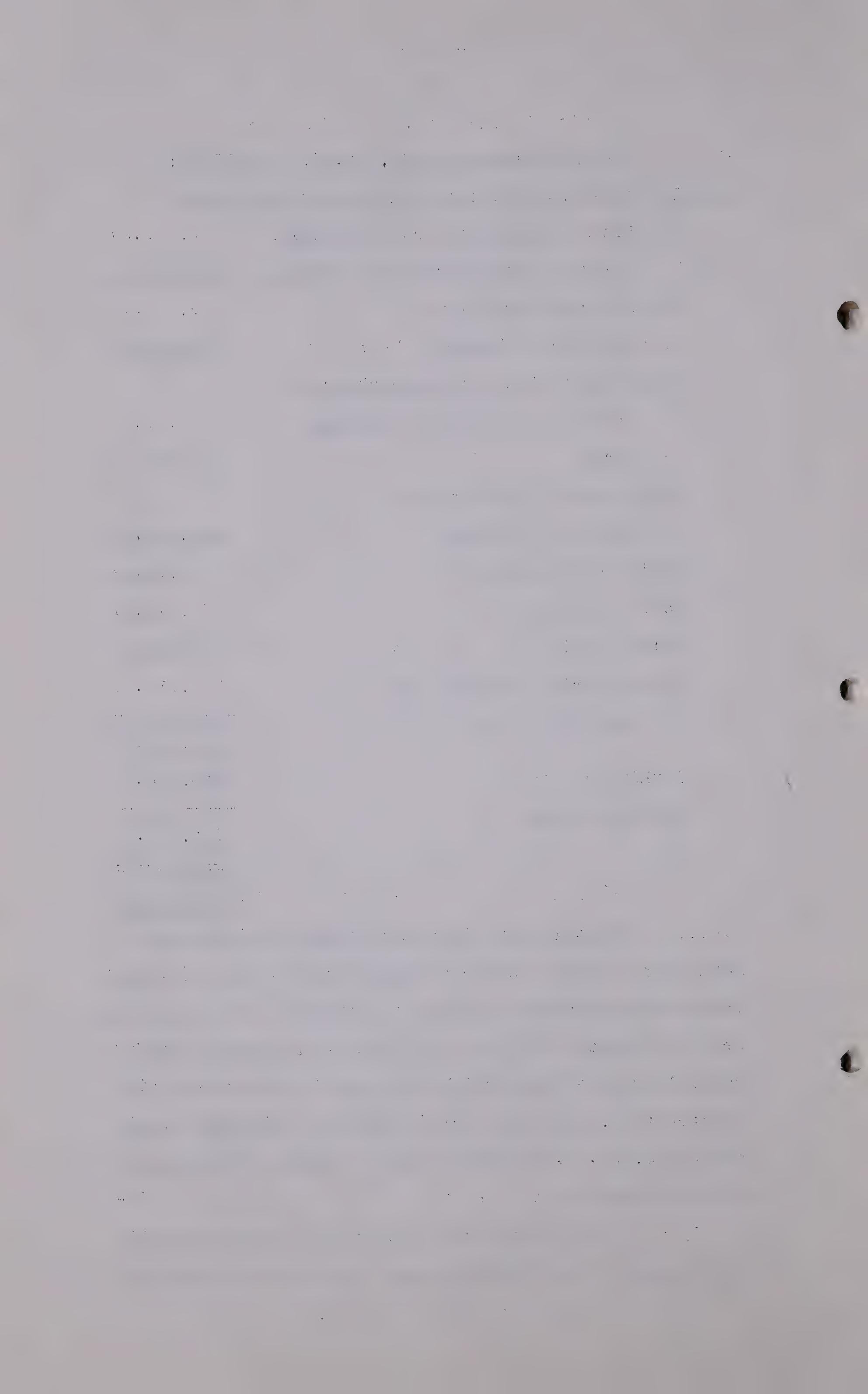
Working capital 20,000.00

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\$992,832.40

These amounts include estimates for the completion of certain work in progress at the time the foregoing computation was prepared and provide for adjustments in the valuation of the water system and existing high pressure lines. Included is a charge of 10 per cent for general over-head and 9 1/2 per cent for interest during construction, the amount claimed in respect of interest being \$28,836.47.

It is but fair to say that the estimates originally made by Mr. McCutchin were based on the assumption

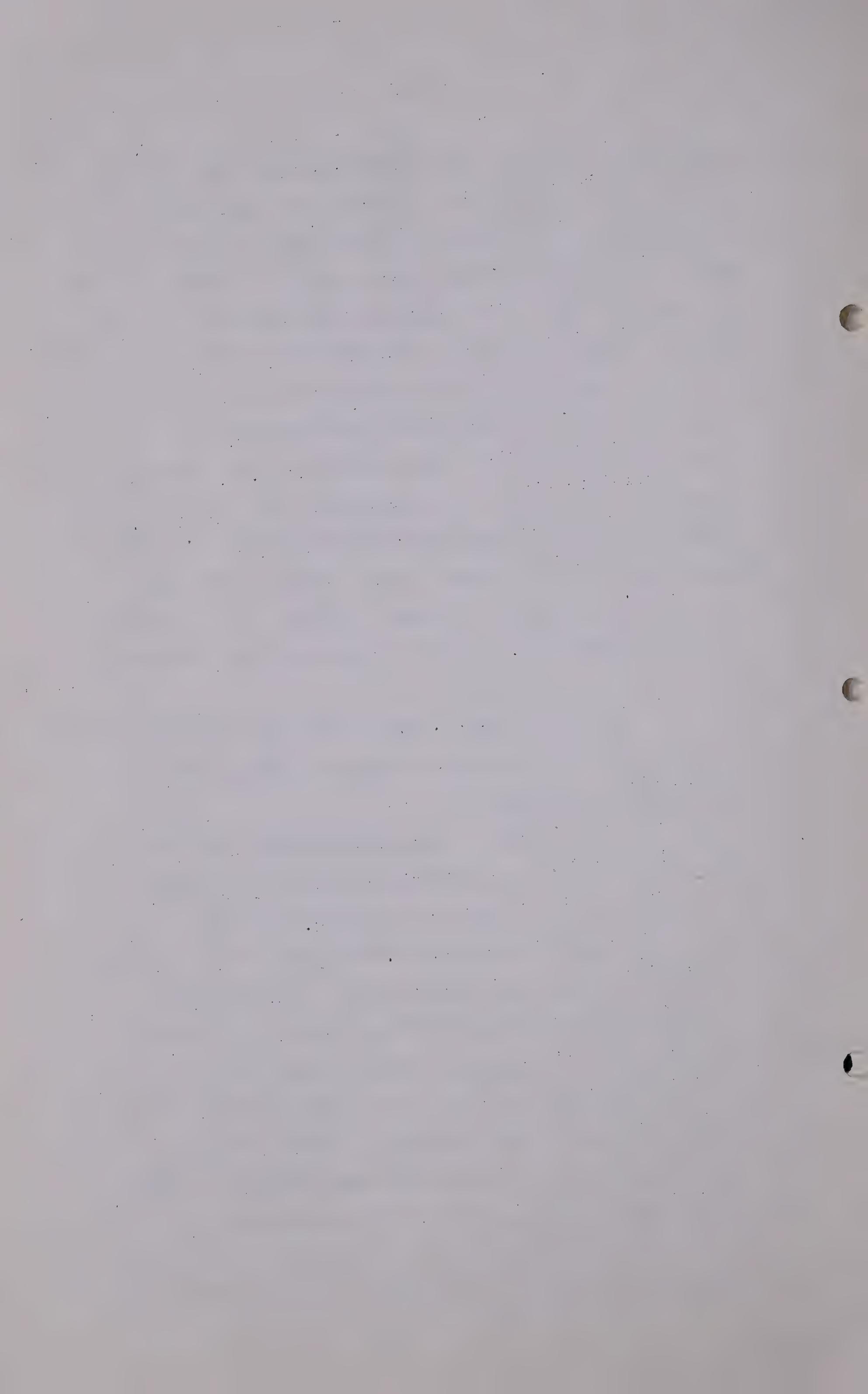


that local labour could be obtained for the construction of the plant and pipe line. As time went on, however, it became apparent that construction of the gas lines could not be completed with local labour until the Spring of 1945 or later and that in the meantime large quantities of gas would be lost. The Board, still keeping in mind the original estimates, agreed to allow British American to enter into a contract with the Gentry Engineering Company for the laying of gas lines at a cost in excess of the original estimate. The additional labour costs, as a result of the Gentry contract, amounted to \$77,263.00, which includes administration and interest during construction. This amount will be reduced by these two items but the company will be allowed 10 per cent for overhead during construction.

The actual cost of new construction was \$786,437.00 as opposed to the original estimate of \$480,681.00, a difference of \$305,756.00.

In June 1944, the Board authorized British American to lower the operating pressure on its system so that gas could be taken at 10 pounds pressure at the well separators and authorized British American to include other wells in its gathering system. The cost of the authorized items was \$44,885.00 but this also includes administration and interest during construction and will be treated in the same way as the Gentry figures. From figures submitted, this additional expenditure makes very little material difference in British American's estimate of the cost of gas delivered to the scrubbing plant.

The Board is of the opinion that the consumer markets should not be called upon to pay for errors made

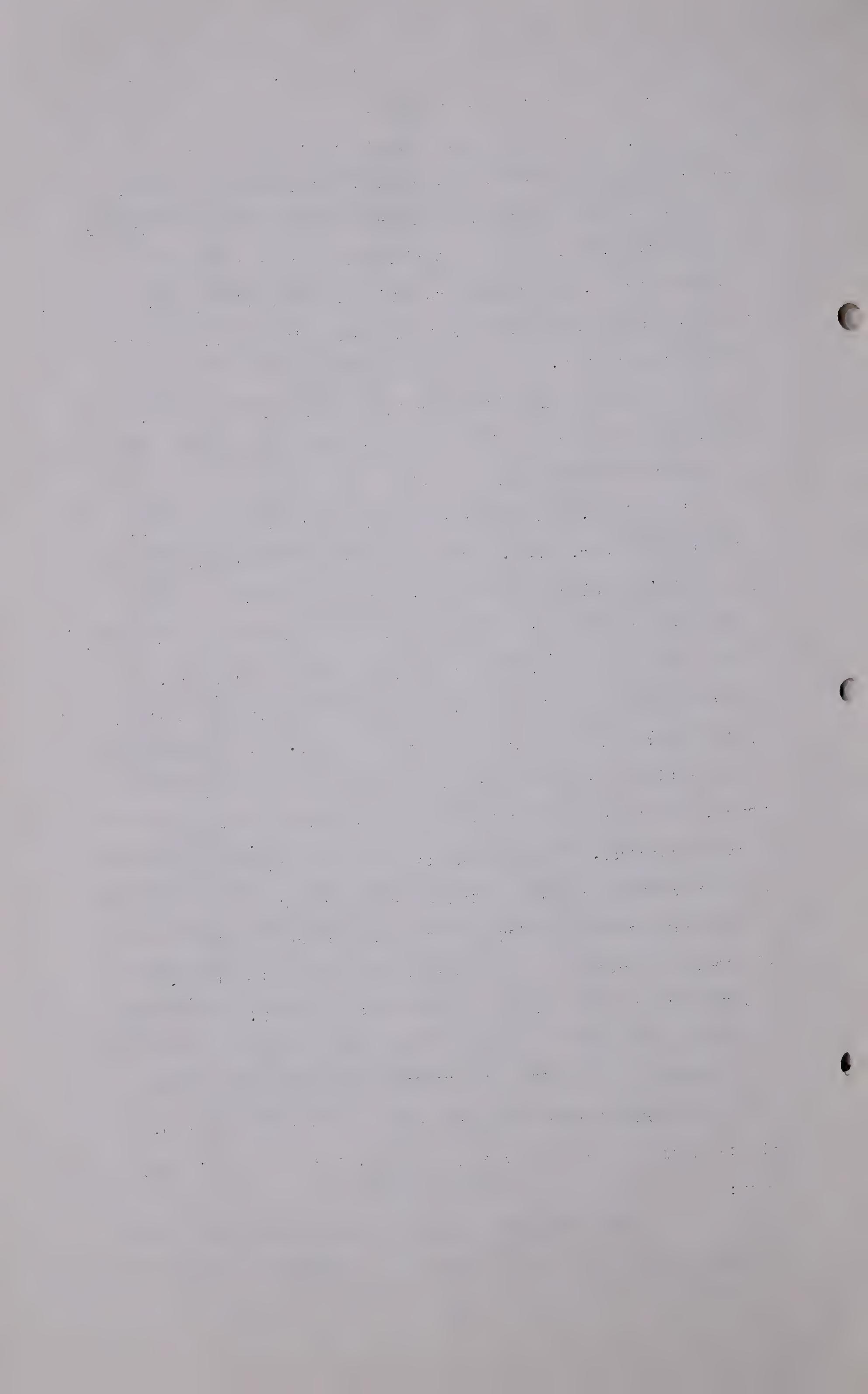


by British American in its cost estimates, and furthermore that there must necessarily be some cost allocation as between the residue gas market and the absorption plant, in the operation of both the water system and the existing high pressure gas gathering lines and that further there must also be some cost allocation as between the residue market, the producers and the absorption plant in the operation of the low pressure gathering system and the repressure system.

British American's rate base will, therefore, be allowed only on the basis of its original estimate plus the water system and the existing high pressure gas gathering lines, duly depreciated on a straight line basis to 31st December, 1954. The Board assumes that Mr. McCutchin's estimates for new construction included an allowance of at least ten per cent to cover contingencies and no further amount will be allowed in this respect. The rate base will include the additional costs authorized by the Board with reference to the low pressure system and the additional costs incurred by reason of the Gentry contract, together with office and automotive equipment and working capital. To these amounts there will be added ten per cent to cover general overhead costs (excepting in the case of the Gentry costs which already include this allowance), inclusive of interest during construction. The resultant rate base is shown in Schedule 2.

RATE OF RETURN

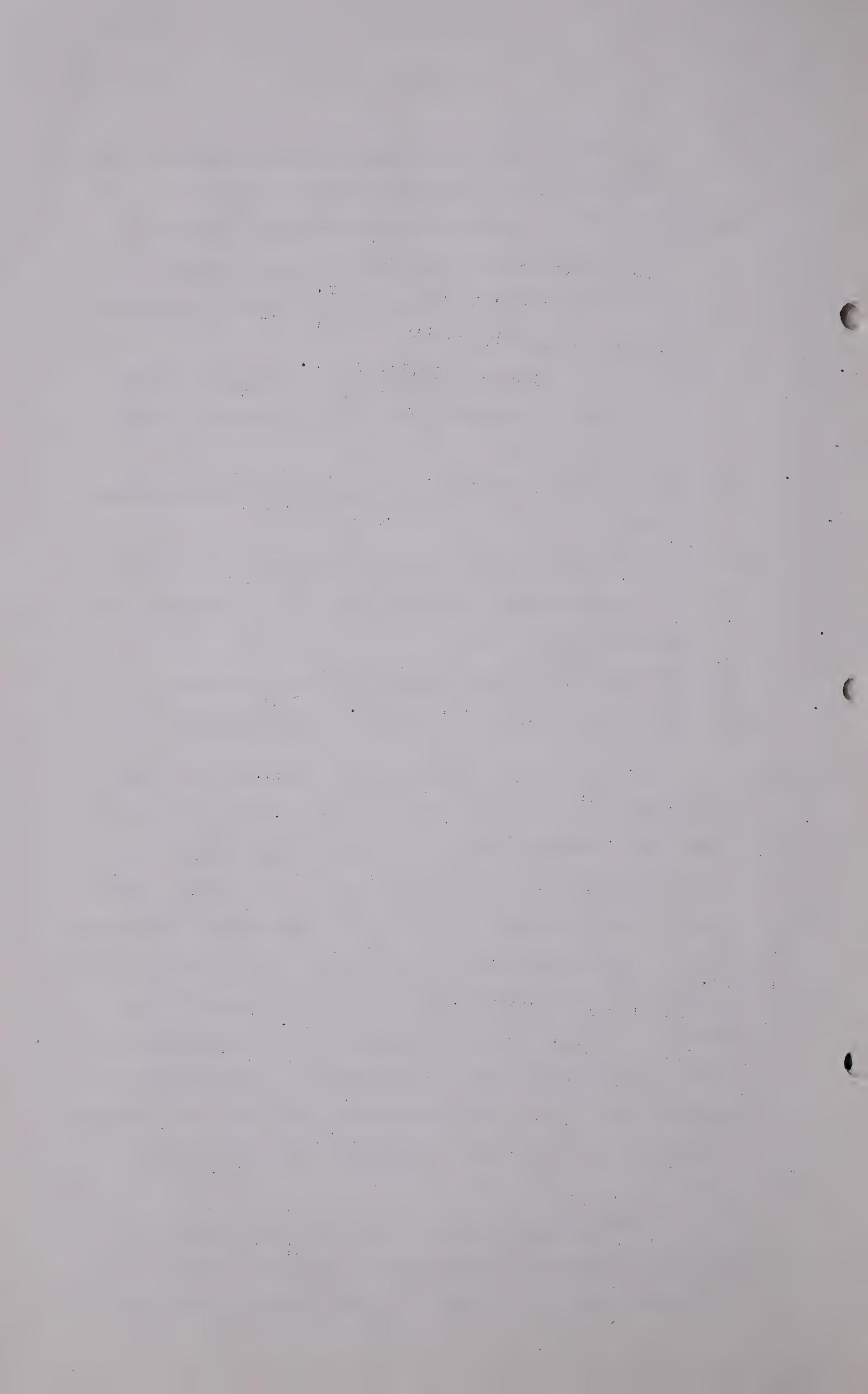
Many factors require consideration in a determination of the rate of return on a utility company's rate base:



1. The current rates of interest paid nationally or in the community in which the company operates.
2. The rate of return secured by capital invested in similar enterprises subject to similar risks.
3. The extent to which income taxes are allowed as an operating expense.
4. The basis on which depreciation is allowed and the relationship of that rate to the recapture of invested capital.
5. The relative certainty of a company's future earning power.
6. The financial structure of the utility or the division of the financial structure into bonds, preferred and common stock.
7. The hazards or risks involved in the business.
8. The company's rate base and its composition.

Consideration must also be given to the effect of the rate of return not only upon the utility but on its customers. A rate which is too small might ultimately deprive the customer of service, while a rate which is too high will impose unjust rates on the customers. On the one hand the interests of the customer must not be subordinated to those of the investor nor must the interests of the latter be overlooked in attempting to protect the former. There may be refinements or extensions of all of the factors mentioned but in the Board's opinion these are basic factors which must be considered and to which due weight must be given.

Mr. Ralph D. Baker, for many years engaged in investment business and now General Manager for James Richardson and Sons (a well known investment house) gave



evidence on behalf of Madison. He predicated his submission on a quotation from the judgment of the Honourable Mr. Justice Lamont in Edmonton vs. Northwestern Utilities, 1929, S.C.R. 192:

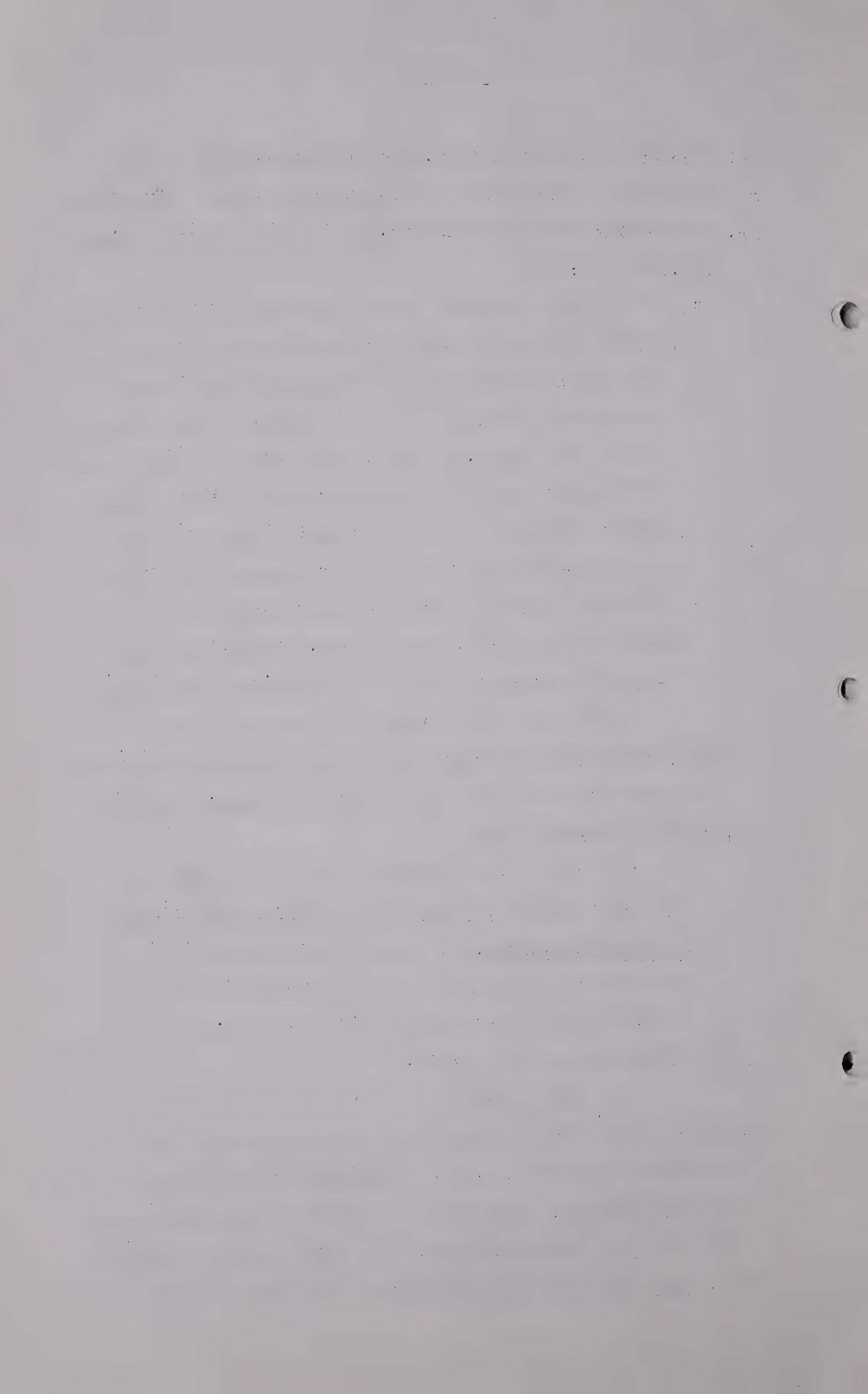
"The duty of the Board was to fix fair and reasonable rates, rates which under the circumstances would be fair to the consumer on one hand and which on the other hand would secure to the company a fair return for capital invested. By a fair return is meant that the company will be allowed as large a return on the capital invested in its enterprise (which shall be net to the company) as it would receive if it were investing the same amount in other securities possessing the same attractiveness, stability and certainty equal to that of the company's enterprise."

With that very general statement the Board respectfully agrees but must point out that in the decision then under review by the Supreme Court of Canada, another pertinent paragraph was:-

"In view of the elements which go to make up the rate base and in view of the altered conditions of the money market, the Board believes that it is justified in reducing the rate of return that the company should be allowed to nine per cent."

The underlining is the Board's.

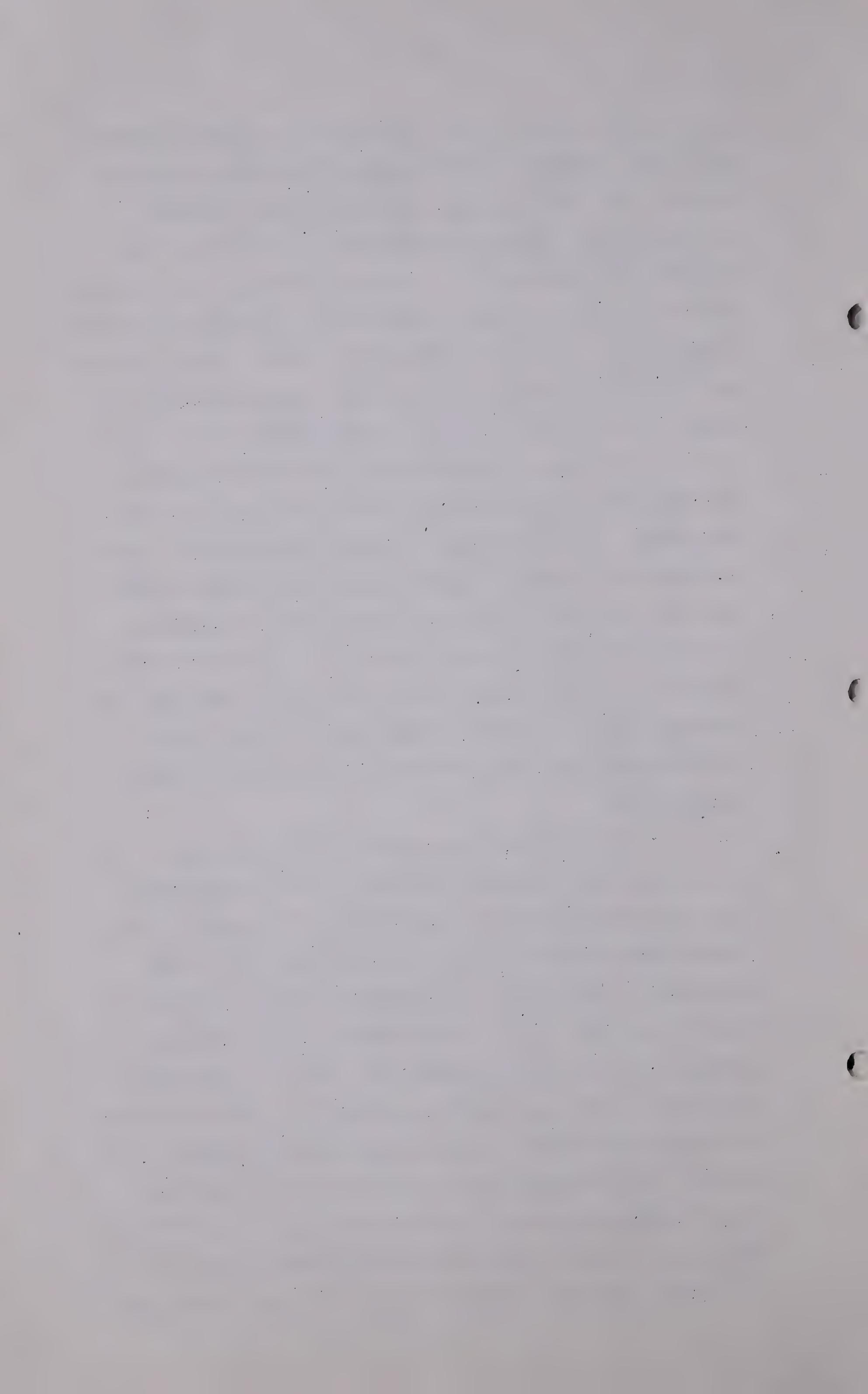
The same relatively general statement is to be found in text books dealing with public utilities and in decisions of various Courts and Administrative Boards in the United States. Applying the factors already mentioned and these judicial statements, the Board is of the opinion that where rates to the customer are so adjusted as to



yield a fair return on the value of the company's property after all operating costs including income tax and depreciation on a basis designed to recapture the original investment and subsequent additions have been met, then the rate is reasonable. If rates are fixed so as to exceed that sum then they become unreasonable. There is a distinct relationship between the rates to be charged to the customer and the rate of return allowed to the utility and the one cannot be arrived at without a consideration of the other.

Mr. Baker considered that Madison was entitled to a net rate of return of not less than 9 1/2 per cent per annum. This conclusion is based principally on figures disclosed in a summary issued by the Bank of Canada which included financial statistics of 678 Canadian companies for the years 1936 to 1943, from which a calculation established an average return of 9.04 per cent for the year 1943. Other statistics relating to 2,665 corporations in the United States were filed indicating an average return of 8.6 per cent.

No information is available as to the high or as to the low income figures earned by various companies in each year nor is there any indication that any of the included companies in the Canadian statistics are public utilities. Then again, the investment shown represents book value, which may be an accounting figure used for the purposes of income tax, whereas the rate to be fixed by the Board in this case must be a return on a fair valuation of the used and useful assets of the utility companies concerned. It is reasonable to assume that the companies, whose balance sheets were used in compiling the statistics mentioned, deducted the maximum depreciation allowed by the income tax authorities and the net result may not and



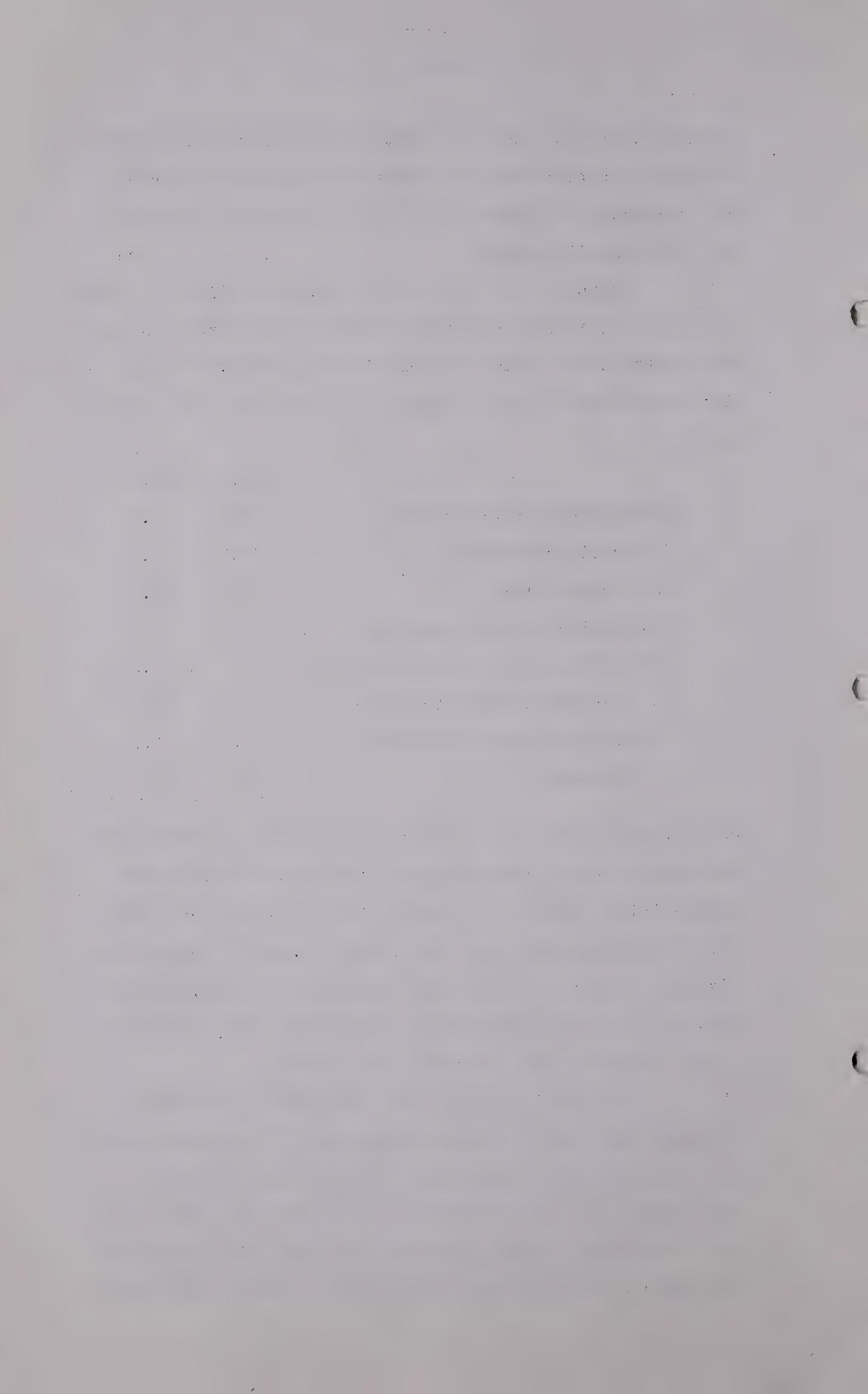
probably does not represent the fair value of the capital employed, in which case the rate of 9.04 per cent would be in excess of a figure which this Board would properly and intelligently award.

Exhibit 108, filed by Mr. Baker, is a publication of the National City Bank of New York, tabulating in groups the income (after income tax) of leading corporations in the United States for the years 1943 and 1944. The result is:

	<u>1943</u>	<u>1944</u>
1327 manufacturing companies	9.6	9.8
109 mining companies	7.2	7.6
143 chain stores	10.1	10.2
236 transportation companies	7.7	5.8
215 public utilities (power, gas, telegraph and telephone)	6.6	6.5
92 service and construction companies	12.5	11.7

These figures which are based upon net worth or book value are subject to the same observations as are the figures quoted by Mr. Baker for Canadian companies but they have the additional merit that the various groups of companies have been segregated one from the other. The percentages given are based on book value and not on a fair valuation of the property used in earning the income.

The Board further must consider the quantum of dividend paid by the Canadian companies. The average paid for 1943 was 6.1. It is true that the amount paid in dividends is in the discretion of the directors but after all the investor is not interested in the net earnings of a company based upon book value but is vitally interested



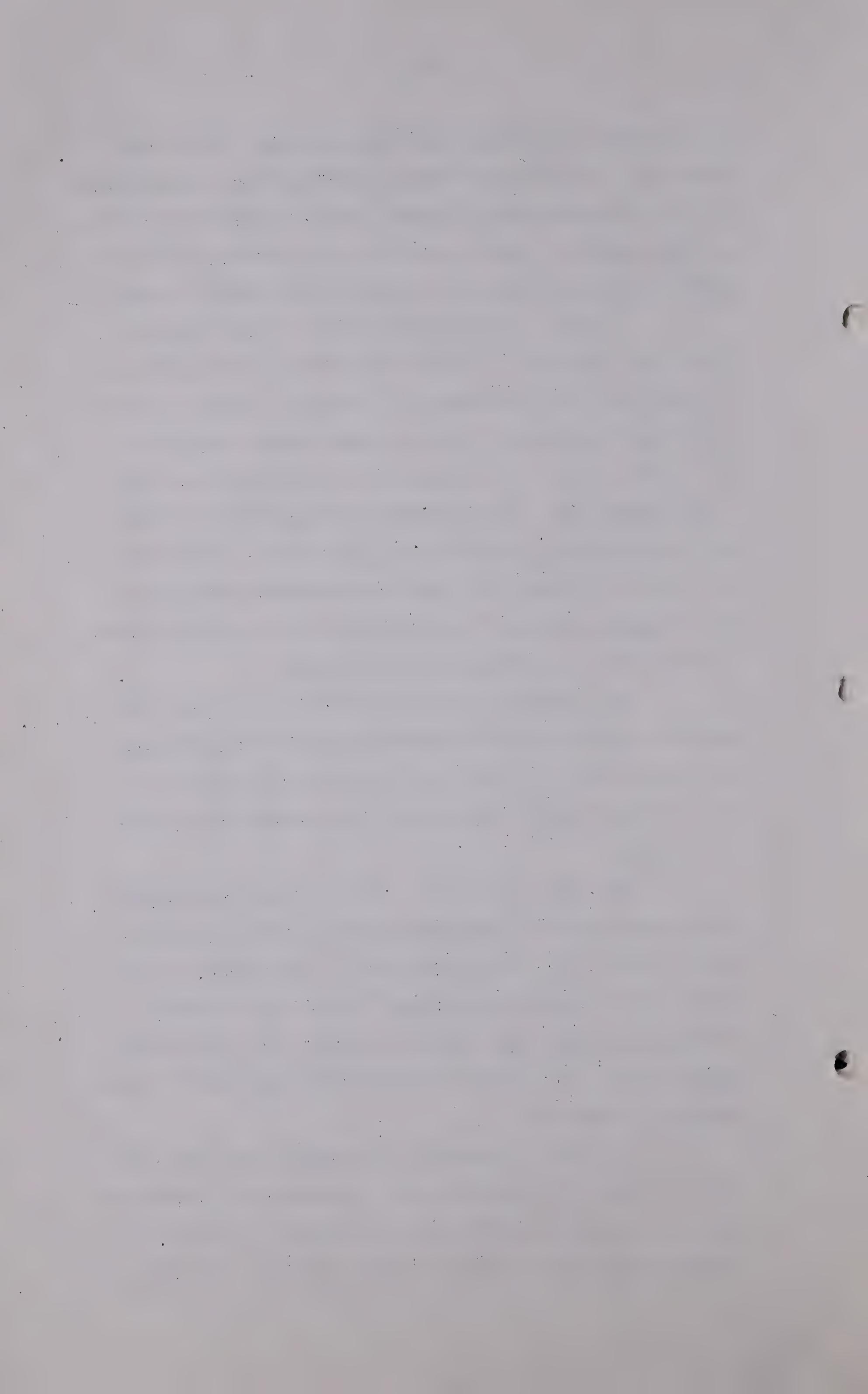
in the actual amount paid out in dividends. It is also true that the difference between net earnings and dividends paid may be reflected in market capital appreciation but on that phase we enter a realm of speculative investment rather than on the rate of return on the amount invested.

A copy of the Financial Post of 16th December, 1944, was filed as an exhibit and was put to Mr. Baker. It envisaged two hypothetical investment accounts, one of which was designed to secure maximum income consistent with safety and the other to secure income plus capital appreciation. The former would earn through diversified investments 4.42 per cent per annum and the latter 3.94 per cent per annum. The list of investments producing the foregoing incomes included public utility investments although none of them were gas companies.

Mr. Donellan, Chief Accountant for B. A., submitted an annual report of British American Oil Company and stated that the net earned income of the company was approximately 11 per cent, this figure being based upon book values.

Royalite, Madison's parent company, is willing to purchase gas not immediately required for the market and to store it in its gas cap area. The purchase price is to be the discounted well-head price, the discount factor being Eight per cent per annum. This investment constitutes a more hazardous enterprise than that to which Madison is committed.

Interest on Dominion Government bonds has been fixed for some time past at three per cent per annum with the bonds presently selling at a premium. The corresponding figure in the United States is 2 1/4 per cent,

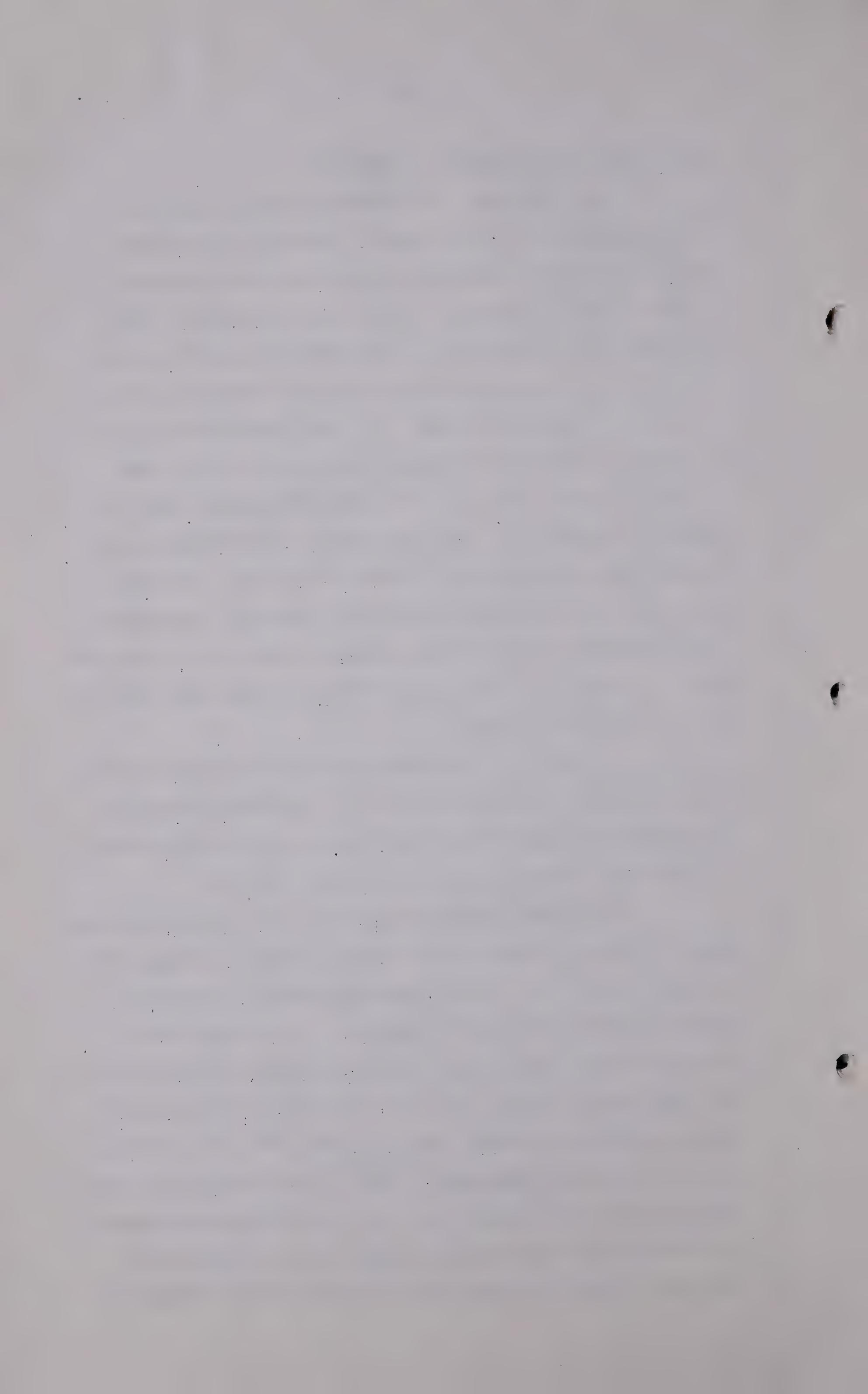


with the bonds selling at a premium.

Mr. Hamilton, the Board's Auditor, made no recommendation as to the rate of return but contented himself by filing statements showing the final results of rates varying from six to nine and one-half per cent per annum after income tax. His submission in the case of Madison is that after allowing a pure interest return at three per cent per annum, the total compensation for the risk involved varies between \$2,305,748 if the rate is six per cent per annum, to \$4,227,208 if the rate is nine and one-half per cent per annum. In both cases, an assumed peak investment of \$2,798,000 is used. He also shows that the approximate point at which the investment could be written off is 13.54 years if the rate is six per cent per annum, and 9.54 years if the rate is nine and one-half per cent per annum.

In the case of British American, with an assumed peak investment of \$837,500.00, the risk compensation is from \$202,756.00 to \$371,720.00 and the write-off period is 6.67 years to 6.20 years following that rate.

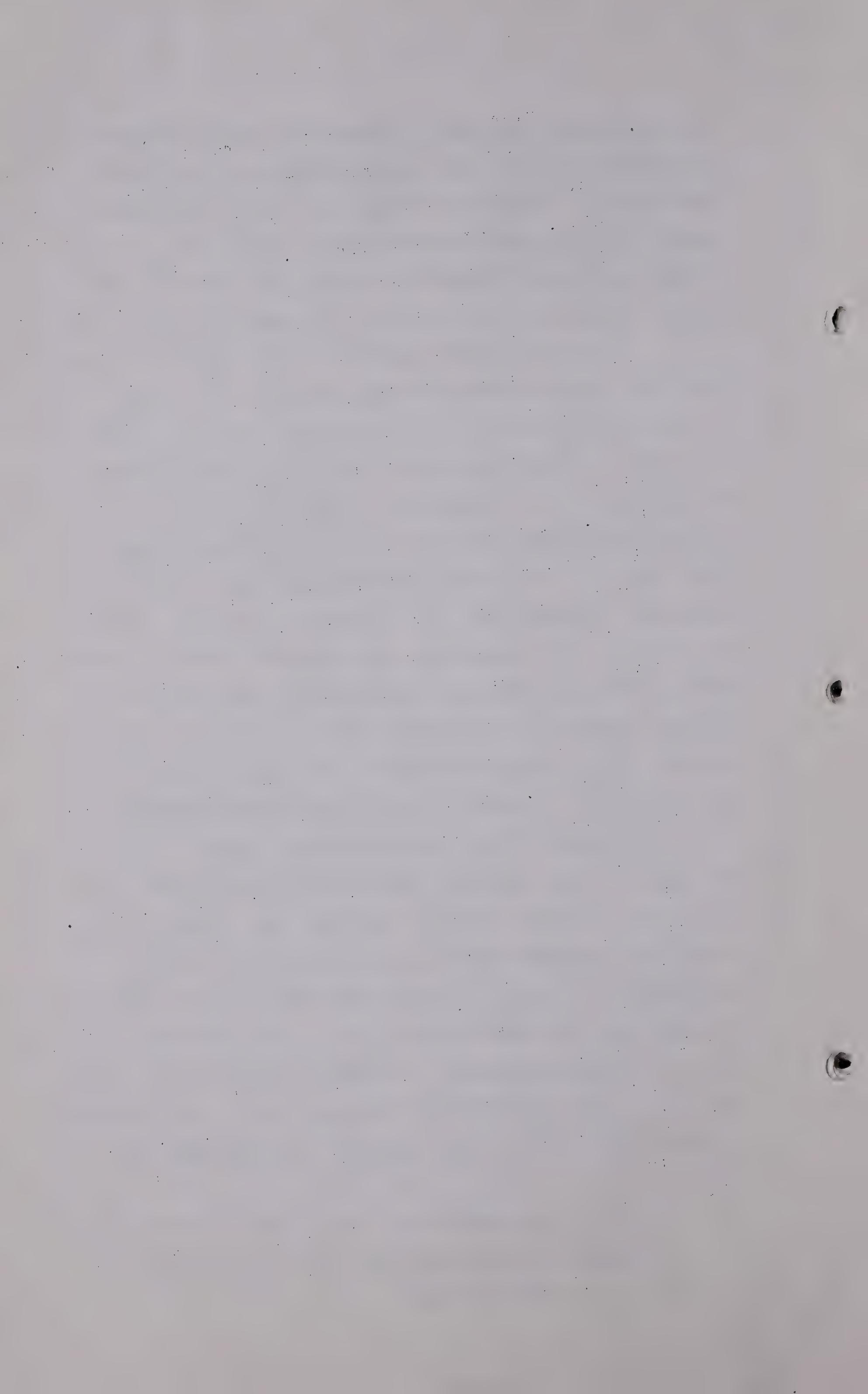
Professor Stewart enunciated the general principle that the rate selected should be sufficient to attract the necessary funds as if the undertaking were to be reconstructed under prevailing conditions. The constituent elements should be pure interest and a definite return for the assumption of risk; that the incidence of income tax is an element to be taken into account; that the method of financing must be considered; that it is difficult to find "comparable" investments; that the risk element is greater in unregulated competitive business than in controlled industries which are relieved from some of the hazards of



free enterprise, and that in general the rate of return should be lower than rates under competitive conditions; that physical hazards can be provided for in depreciation rates. He considered further, notwithstanding the difference between Madison and British American that they should be dealt with on the basis of comparable principles.

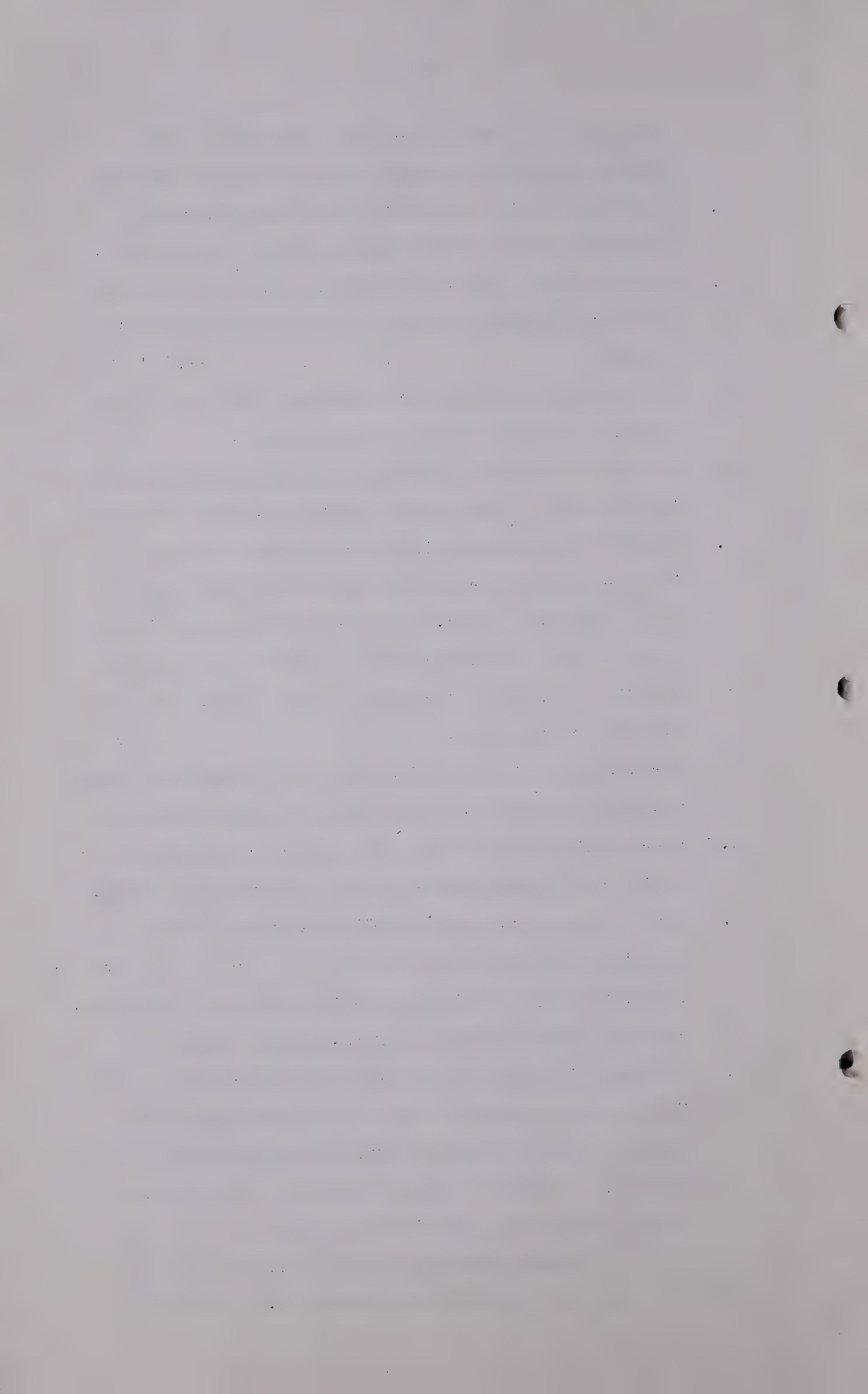
It was suggested that the rates allowed to Valley Pipe Line Company Limited, engaged in transporting oil, namely, eight per cent, and to Canadian Western, a retail gas company, namely, eight and one-half per cent, should be standards to be adopted by the Board in the case in issue. It must be pointed out that in the Valley Pipe Line case, the life of that company according to its officials is very short. In the case of Canadian Western, the rate was fixed years ago when financial conditions were vastly different from those which obtain today and what is equally important is that neither the customers of that company nor the civic authorities have sought to have the rate reviewed. It must be further considered that the rate was fixed at a time when the visible supply of gas was small and the company's hold on life was precarious. This Board does not presume to say what rates might be allowed to Canadian Western on a review of its whole position and in light of present day conditions and further does not consider that because of the eight per cent rate allowed to Canadian Western, the rate of Nine and one-half per cent per annum asked for by Madison and B. A. Utilities is warranted. In the final analysis the Board must consider:-

1. The rate of interest before income tax on government securities is less than three per cent per annum on the market price of bonds.



2. There is no evidence before the Board respecting interest rates on mortgages in the Calgary district.
3. The only relevant reasonably conclusive evidence before the Board respecting comparable investments is that public utility companies in the United States earn approximately six and one-half per cent per annum.
4. The companies concerned in this case will be allowed income tax as an expense of operation.
5. The life in the field in the case of Madison is from twenty-five to thirty years and in the case of British American is ten years. Neither company is likely to be subjected to destructive competition for even if new fields are discovered and if the owners of these fields demand and are allowed a share of the Calgary market, the life of the Turner Valley field will thereby be extended.
6. Depreciation is being allowed to each company on bases designed to permit the recapture of invested capital.
7. Both companies might very well have set up capital structures divided between bonds, preferred and common stock, thereby reducing income tax charges with resultant benefits to consumers.
8. It is difficult to measure to what extent the business in which these companies are engaged is any more hazardous than any other commercial undertaking. They however, are protected from destructive competition and are assured of a certain - although perhaps variable - return on invested capital, and have an assured market for gas for many years.

The general principle which is binding on this Board has been laid down by the Supreme Court of Canada.



The evidence is that average net earning rates in Canada are 9.04% and that in the United States the average net earning of Public Utility companies is 6 1/2% - in both cases based on book value. The rate bases fixed for both companies are computed on original or adjusted historic cost with an allowance for depreciation less than the amount shown upon the books but computed on principles which the Board believes to be scientific. The resultant rate bases may therefore be said to reflect true book value.

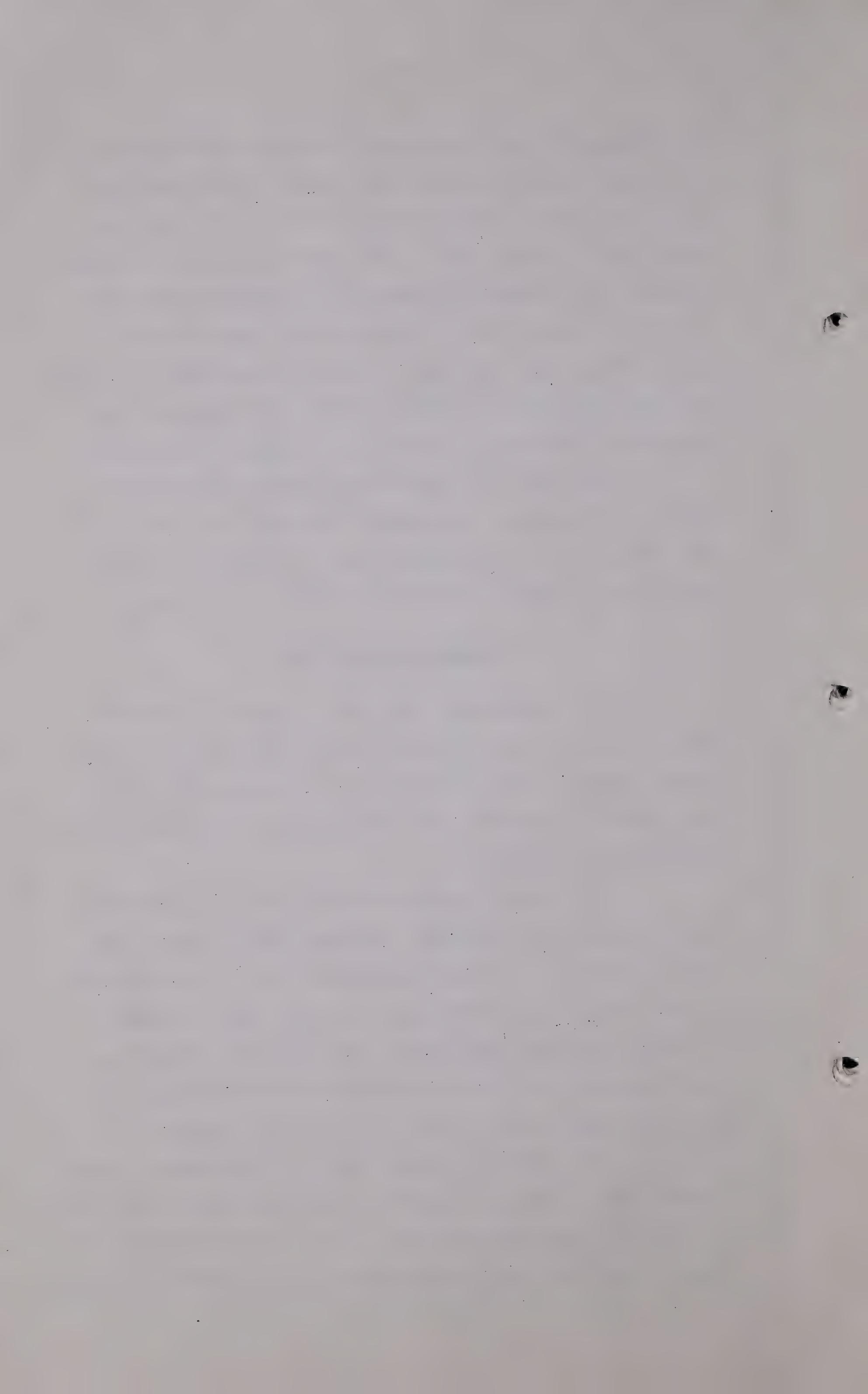
Applying the specific and general principles before enunciated to the problem in hand, the Board is of the opinion that a net rate of seven per cent per annum should be allowed to Madison and to B. A. Utilities.

#### FUTURE DEPRECIATION

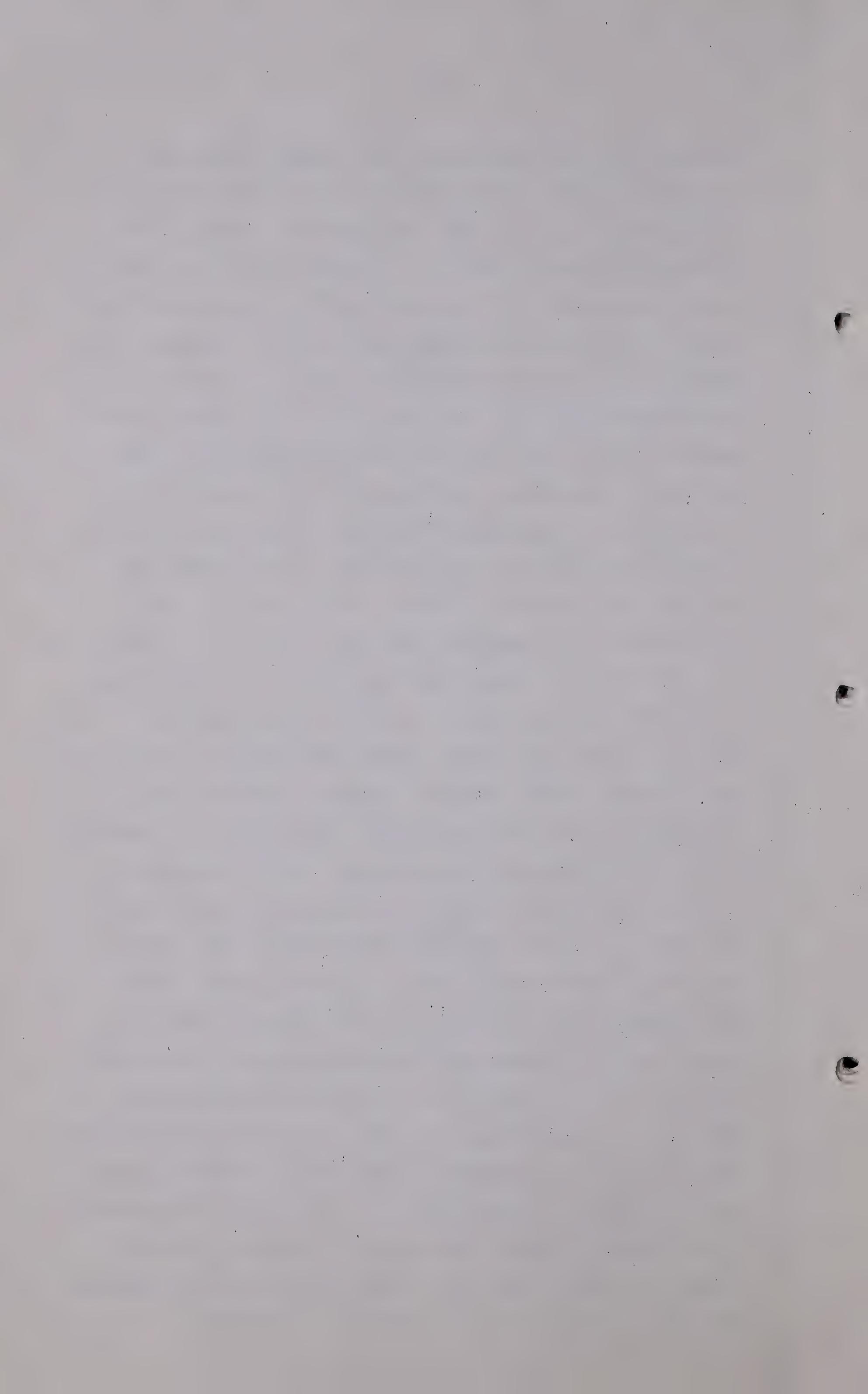
In considering future depreciation, it must be kept in mind that two types of capital equipment are used by each company and that different circumstances apply to each type of equipment, and that different considerations apply to each company.

The evidence indicates that pipe line installations, compressor stations, scrubbing plants, power and water plants and repressuring plants, have a life in excess of the life of the field, and that items such as transportation equipment and office equipment are limited to their service life. It is obvious that depreciation on the latter items must be on a straight line basis.

The matter of salvage value is pertinent. If the fixed capital items are amortized with relation to the life of the field, no matter by what method whether straight line or annuity or unit depreciation, the operating companies



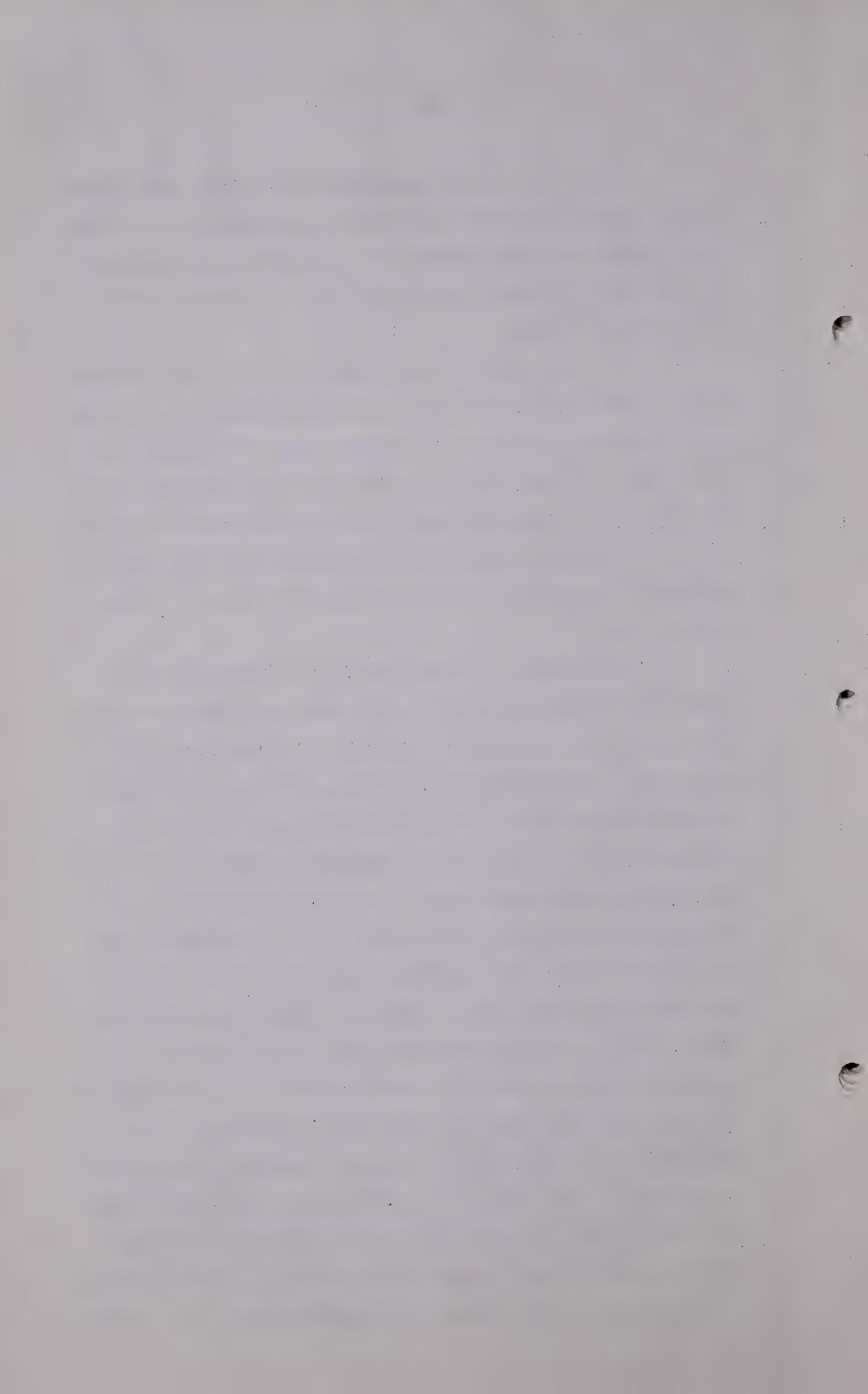
(subject to obsolescence and other hazards) will have received a return of the original capital when the field's life expires and will still own equipment having an indeterminate service life. It is possible that pipe lines cannot economically be recovered while it is possible that other items which are substantial may have a salvage value, depending upon whether or not a use can be found for them. Speculation as to the future use or disposition of these assets is futile at this time and the problem must await the event. As already indicated in the discussion of rate bases, the question of Salvage must be considered at a later date and in the meantime will not be taken into account. In the case of Madison, two methods of unit depreciation were suggested for fixed equipment. Under the first method, the proposal was that all equipment used in handling wet gas would be subject to depreciation related to the total volume of wet gas handled. The residue gas gathering system would be subject to depreciation on the volume of estimated dry gas to be handled. In the case of the scrubbing units, depreciation would be calculated on the volume of gas to be purified over the total life of the whole gas field. Service units afford power, steam and water to both wet and dry gas operations while the repressuring units will be used for a limited number of years for that function and thereafter may and likely will be used in the field for other purposes. Equipment now used for one purpose may at a later date be used for another purpose, so that depreciation applicable to function could lead to accounting complications in adjusting depreciation when functions change. Dual service equipment would be subject to depreciation adjustment according to the quantum of service rendered to the respective operations.



The other method suggested is to apply the total field connected reserves and residue gas sales to the total fixed assets without reference to the particular function of the various pieces of equipment or to the wet or dry gas handled by each.

It is conceded by all parties to the enquiry that unit depreciation is the most practical method when dealing with a wasting asset such as natural gas. The Board, however, must consider the application of the principle, that is, whether it should be applied to all the items included in the rate base or only to those assets which are used in gathering, compressing, repressuring, purifying and transporting gas.

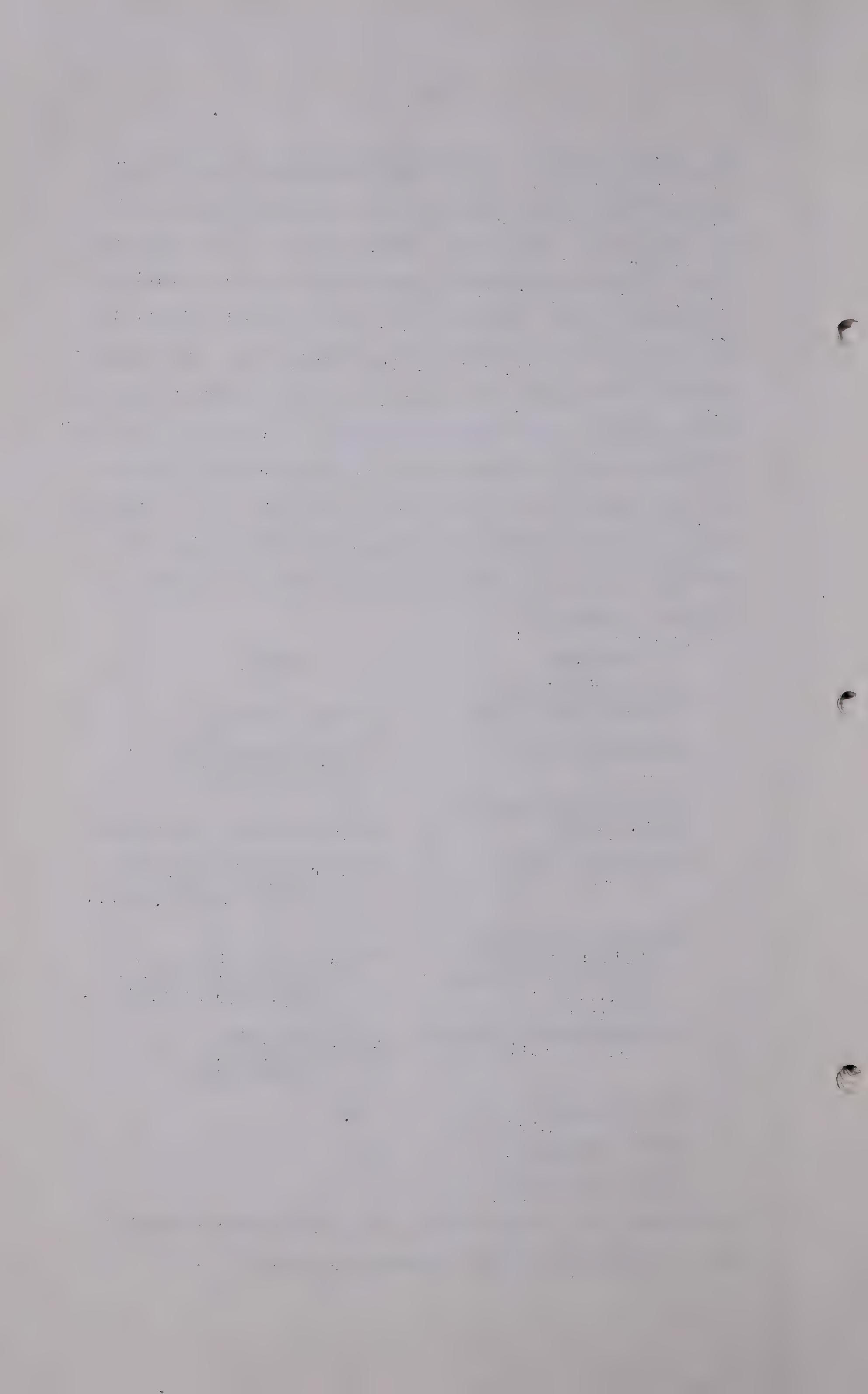
Method No. 1 is subject to the disability of complicated accounting but has the merit of greater accuracy in the result. The use of Method No. 2 lends itself to simplicity in accounting but does not reflect unit depreciation with respect to volumes of wet or dry gas going through the various pieces of equipment. Method No. 1 will accelerate depreciation which in time could result in a reduction in the quantum of return on the investment over a period of years. The suction line from G. O. R. to Madison's compressor station and the residue gas line will have a service life greater than the life of this area and since the salvage value of these lines will be problematical it would seem that straight line depreciation is to be preferred in the case of these items - salvage value to be reconsidered. The Board does not consider that unit depreciation is properly applicable to the warehouse building or to the boiler and electric light plants. The two latter plants afford utility service to Royalite and to the Valley



Pipe Line Company. The evidence indicates that the service given to these companies will decrease and may not be required for some years before the end of the gas field life. Unit depreciation charged to these two operations on a simple sales formula could result in rates lower than they would be entitled to on the straight line time depreciation factor and, conversely, when these services are no longer used, the gas operators would be called upon to bear the whole cost of depreciating the undepreciated balance of these assets and so, notwithstanding Madison's preference for the simpler of the two methods, the Board is of the opinion that the following classification is fair to all parties concerned:

<u>Assets</u>	<u>Factor</u>
Gathering Lines and Compressor Plants	Wet gas gathered
Scrubbing plants	Dry gas throughput - excluding fuel gas
G. O. R. Suction and Residue line	Straight line - 10 years
Repressure lines	Straight line from year of installation to December 31st, 1959.
Boiler and electric plants, warehouse, Residences and water plant	Straight line from year of installation to December 31st, 1963.
Transportation equipment	25% first year 20% second, third and fourth years
Fire equipment	5%
Office machines	10%
Office furniture	5%

Adjustments can be made in the unit depreciation factors from time to time as the exigencies require.



For the purpose of computing depreciation on wet gas throughput items the wet gas reserve in the Madison area of the field is fixed at 349.605 billion cubic feet as at 31st December, 1943. That amount is arrived at as follows:

Total dry gas reserve	358.558
Less reserve in B. A. and	
G. O. R. areas	65.546
	<hr/>
	293.012
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Convert to wet gas basis by applying

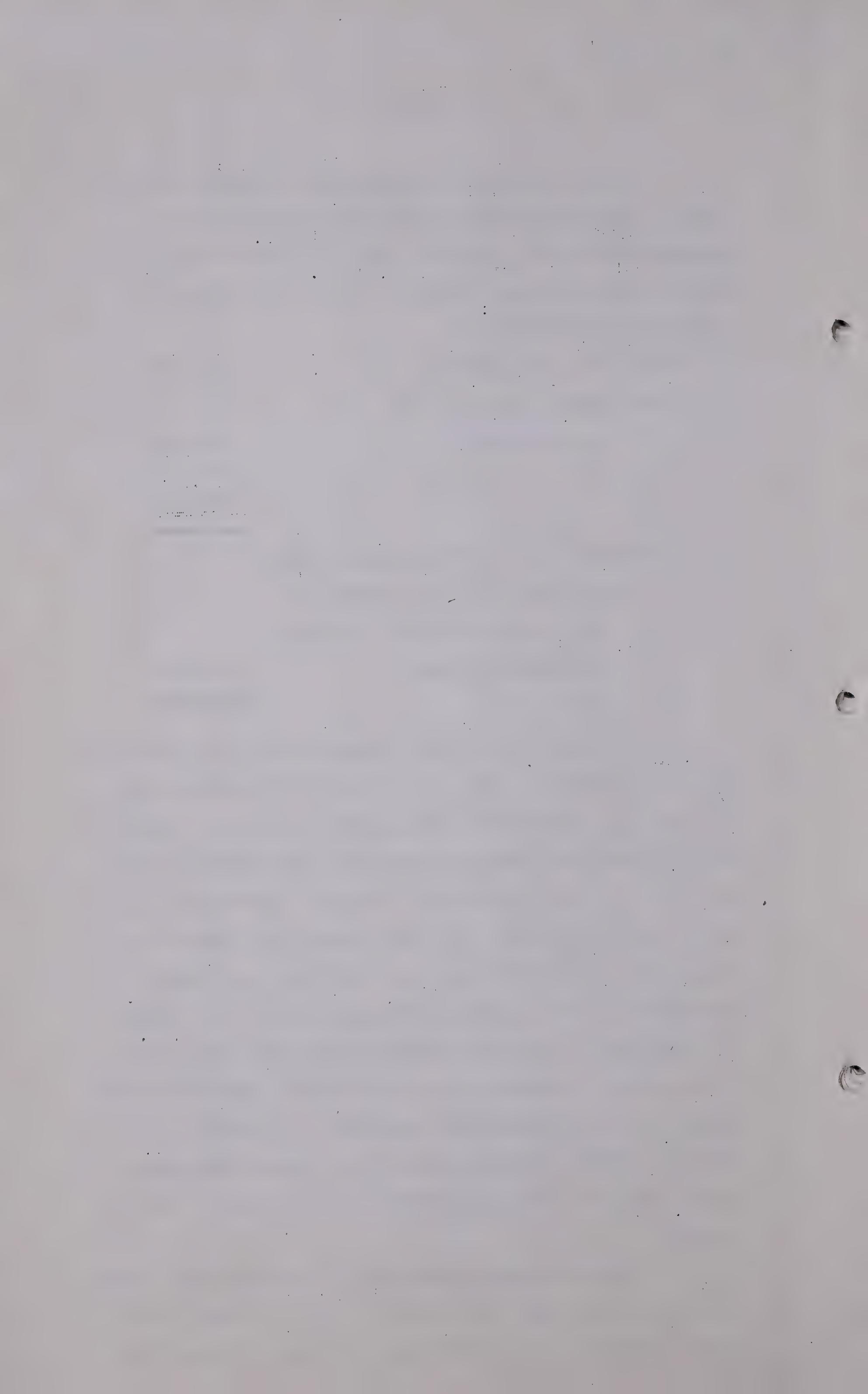
percentage 119.3146 arrived at

by wet and dry volumes estimated

by Madison witnesses	349.605
	<hr/>

The Board is unable to apply the same principle to B. A. Utilities. The book value of the assets taken over by this company from its parent company are trifling compared with reproduction cost new less observed depreciation. In the interests of equitable treatment the Board has decided that the high pressure gas and water lines should be included in the rate base at adjusted historic cost with depreciation on straight line basis. The substantial rate base fixed by the Board for B. A. Utilities, as compared with the estimates upon which the installation was permitted, requires, in justice to the company, to the producer and to the ultimate consumer, that depreciation be accelerated to the greatest possible degree.

Accrued depreciation on all assets taken over by B. A. Utilities and future depreciation on these assets and depreciation on new installations must therefore be



computed on a straight line basis commencing with the first year of installation and on the assumption that the system has a life until 1954. This decision may be subject to adjustment in the light of experience.

WELL-HEAD PRICE

Section 72 (1) (a) of The Natural Gas Utilities Act, as originally enacted provided:

"Notwithstanding the terms of any contract, the Board shall fix and determine:

(a) the just and reasonable price or prices to be paid for natural gas in its natural state as and when produced from the earth at the gas exit from the separator .....and in all other cases from the well-head either alone or in association or conjunction with other petroleum products or hydrocarbons."

In 1945, the Act was amended and Subsection (1) now reads:

"Notwithstanding the terms of any contract, the Board may and by Order of the Lieutenant Governor in Council shall fix and determine ....."

By an amendment in the same year a proviso was added to paragraph (a) of Subsection (1):

"Provided always that the price or prices fixed pursuant to any of the provisions of this paragraph shall not include any price or value of any component part of the natural gas to be extracted therefrom and sold before delivery of the natural gas to a public utility as defined by this Act or by The Public Utilities Act for distribution to the ultimate consumer."



